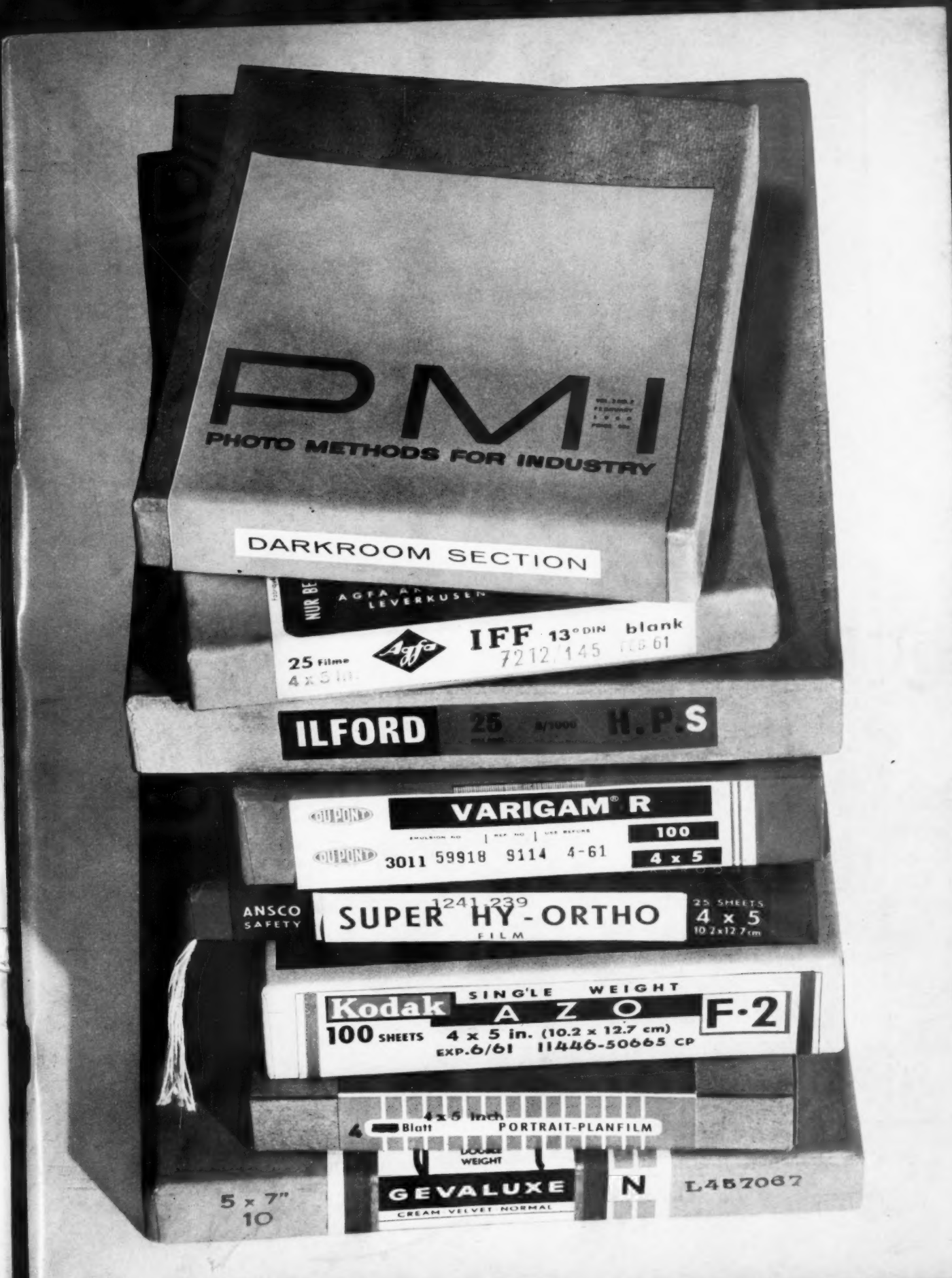
PMI
PHOTO METHODS FOR INDUSTRY
DARKROOM SECTION
AGFA
LEVERKUSEN
Agfa
IFF 13° DIN blank
25 Filme
4 x 5 in.
7212/145 FEB 61
ILFORD 25 H.P.S
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100
DUPONT
3011 59918 9114 4-61
4 x 5
ANSCO
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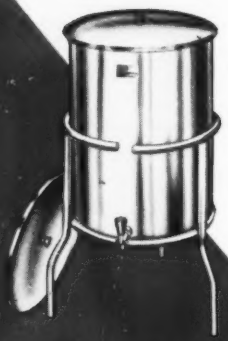
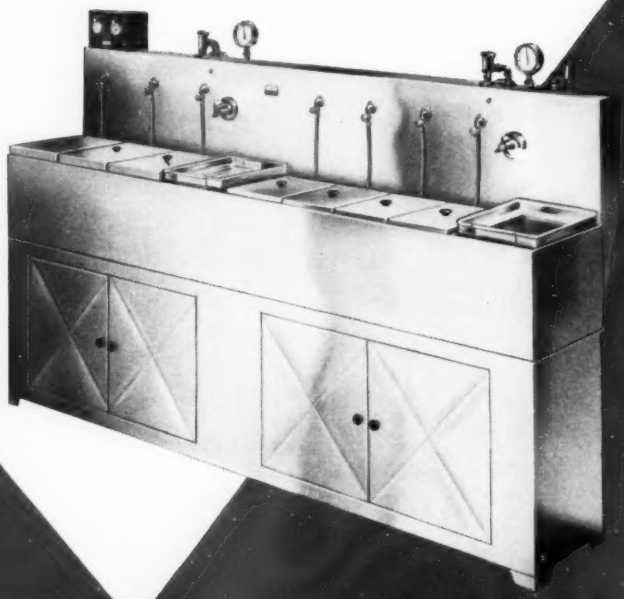
FILM
25 SHEETS
4 x 5
10.2x12.7cm
Kodak
SINGLE WEIGHT
AZO
F-2
100 SHEETS 4 x 5 in. (10.2 x 12.7 cm)
EXP.6/61 11446-50665 CP
4 Blatt 4 x 5 inch PORTRAIT-PLANFILM
LOW WEIGHT
GEVALUXE
CREAM VELVET NORMAL
N
L457067
5 x 7"
10

STORAGE TANK
For mixing, too. Deep drawn, seamless, cylindrical for easy cleaning. Models for 5, 10, or 25 gals.



COLOR PROCESSOR
with built-in Nitrogen Burst agitation and temperature controls, guarantees ABSOLUTE UNIFORMITY in development.



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Calumet equipment gives top performance because it is made to top quality standards

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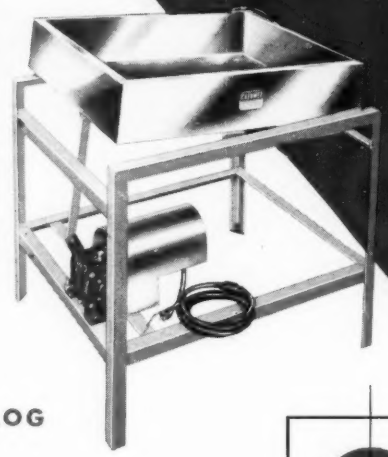
Automatically controls water flow, timing, washing action. Water action, rocking wave motion keep prints separated, in constant motion.



WRITE FOR CATALOG

COPY STAND
with copy table, easel and camera platform speeds up and simplifies copying.

HYPO ROCKER
Motor powered to rock, agitating the solution that fixes the prints. Saves time, gives better results.

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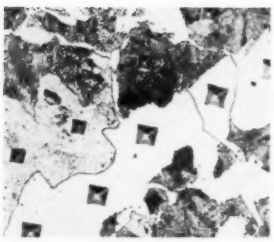
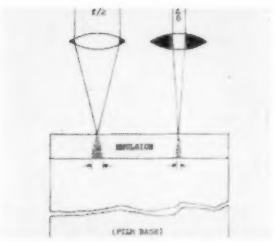
LEICA versatile tool for industry



PHOTOMICROGRAPHY – Steel surface greatly magnified through LEITZ microscope, recorded by LEICA. Diamond impressions made by LEITZ tester indicate degrees of hardness.



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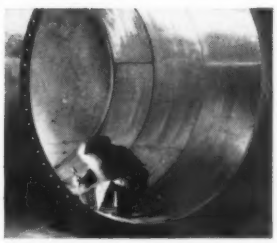
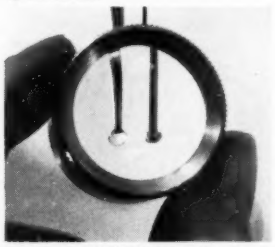


ON LOCATION – The essential compactness of the LEICA System makes it particularly suited to on-the-spot documentation, even under adverse conditions. Photo by Liesel Springmann.



MACRO PHOTOGRAPHY – Common pin and an unfinished micro-optic under magnifier, photographed with LEICA, lens extension and VISOFLEX. Photo by Liesel Springmann.

CLOSE-UP ACTION – Studies of actual production assembly or details of operation are made easily with LEICA hand-held, when using the unique DUAL-RANGE SUMMICRON lens.

PROMOTION and public relations, important aspects of modern business, beautifully handled by versatile and dependable LEICA photography. Photo: Jones & Laughlin Steel Corp.

You ought to consider the rugged and dependable LEICA M-3 as an investment for your company. The world's most advanced camera (an ultra-precision 35mm camera, we might add), is the heart of a photographic system that meets virtually every requirement of science, industry, of documentation and public relations. And, it's the most economical photographic system you can get. Over 200 precision LEITZ accessories are available as complements of the M-3, extending its versatility to proportions unmatched in the photographic field. You have to see it to believe it—call on a franchised LEICA dealer today, or write:

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FEBRUARY, 1960

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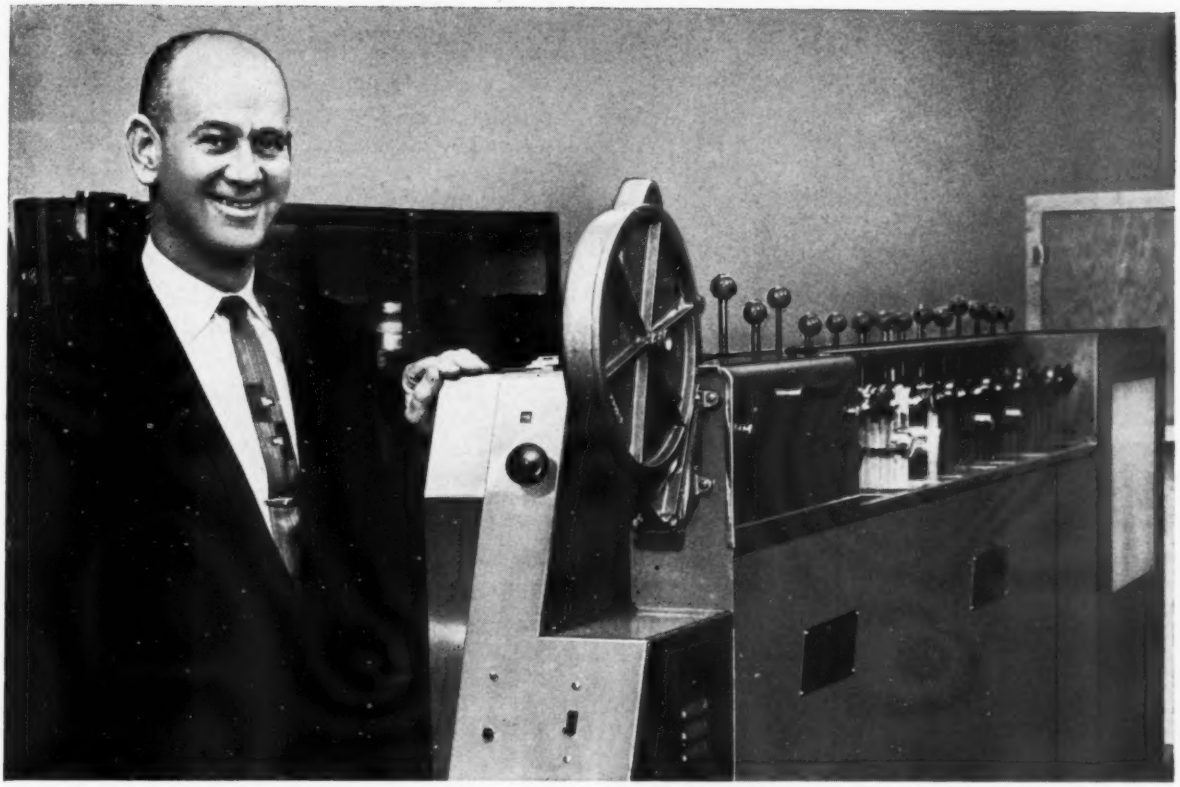

Travis Burton, President Educational Enterprises, Tyler, Texas

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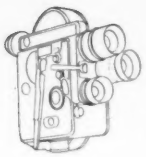
Get more information. Circle 440, page 85

WHY BOLEX GIVES YOU



The Bolex is precision-made in the heart of the Swiss watchmaking center in the Alps. In optics, in mechanics, this superb instrument is made to microscopic tolerances unmatched by any other camera in its field.

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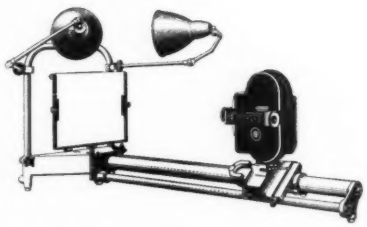
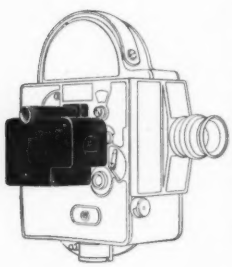
Bolex Tripod: Special lightweight aluminum construction for extra strength and easy carrying. Features smooth action pan head plus unique 135° vertical tilting (shoot straight down!). Nonskid rubber feet convert to metal spikes for soft ground, separate locking controls, cable release through handle. $99.50.

Bolex 16mm Titler: Makes titles, animation, extreme close-ups easy. Basic kit: optical bench, main frame, two reflectors, title frame, sliding cradle and rackover, $169.50. Accessories: multipurpose frame, roller screen, drum, turntable, mirror frame, animation frame, crank, pivoting plates, three-plane support, $141.00.





Bolex Unimotor: Electric motor drives camera through full roll of film with absolutely constant speed. No key scenes lost while winding! Easy to attach; no special tools necessary. Speeds from 12 to 32 frames per second. Operates on batteries or AC current (with optional transformer). Complete with 10' extension cord and switch, de luxe carrying case for batteries, only $89.50.

Precision-Ground Bolex Lenses: Specially made by Kern-Paillard, each with six or more elements for critical sharpness and high speed, all anti-reflection coated for maximum light transmission and color fidelity. Switar 10mm f/1.6 extreme wide angle, $149.50. Switar 25mm f/1.4 very fast normal lens, $168.00. Switar 75mm f/1.9 extra fast telephoto, focusing 5' to infinity, $145.00.

All prices include Federal Excise Tax where applicable.

Get more information. Circle 465, page 85

THE WORLD'S SHARPEST MOVIES

Lenses are precision-ground, coated, and matched for color rendition from wide angle through telephoto. Made of the world's finest optical glass, they assure the finest detail possible, the truest colors.

Exact speeds are fixed by a special motor governor. A geared mechanism provides precise footage readings. Shooting control is easier and more positive with a Bolex than with any other camera made.

TAKES AUTOMATIC FADES

Perfect lap dissolves...more exposure control... through-the-lens viewing and focusing while shooting

New variable shutter on famous Bolex 16mm Reflex puts fades at your fingertips. Lap dissolves are smooth and easy. Use the variable shutter also to cut exposure for sharper fast action and bright scenes ordinarily calling for a filter. Eliminate distracting backgrounds by opening lens wide, cutting exposure with shutter.

A new timer gives you *automatic* fades at the push of a lever. The automatic REXOFADER is preset to gradually close the variable shutter for a fade-out over an exact number of frames. For a perfect lap dissolve simply backwind over the same number of frames, then press the REXOFADER for an automatic fade-in.

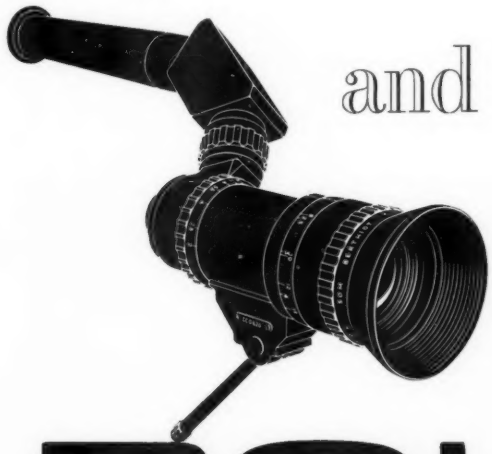
Reflex viewing ends parallax forever. You view through the shooting lens *while you're shooting*. No worries about distance, centering, focus. If it looks right, it is right.

Other standard equipment includes hand backwinding, footage and frame counters, built-in filter slot, octameter viewfinder crank with fields for eight different lenses for special filming situations, automatic film threading, spool ejection lever, settings for time exposure, single frame and continuous running.

H-16REX is $400 with Lytar f/1.8 lens. The REXOFADER is optional at $37.50. Lenses shown optional at extra cost.

For a three-lens turret 16mm Bolex at $250, see the precision-made H-16T. This camera features a special "Preview-Finder" for viewing with four different lenses as well as most of the professional settings of the Reflex above. The H-16M is a single-lens 16mm Bolex with C-mount for interchangeable lenses and professional features at only $200. Prices are with Lytar f/1.8 lens.

Write Dept. B-PM2 today for literature and name of your nearest Bolex dealer.



and zooming, too!

New Pan Cinor 85 lens zooms from 17mm for wide angle effects through 85mm for telephoto. This advanced lens opens to f/2 for filming in dim light. Has reflex through-the-lens focusing and viewing as well as a split-image range finder. Color and detail are of unusually high quality. C and EK mount for 16mm cameras. For extra sharp zooming, see this fast new Pan Cinor lens today, $420.00.

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Get more information. Circle 408, page 85

F.Y.I.

The world of art and stuff

As readers of this section know (and if they don't know, we are telling them), FYI is basically shy, modest and unassuming. In the face of compliments which have turned many a head, we have remained, are remaining and will remain shy, modest and unassuming. A recent dispatch from our grey flannel spies in the world of TV has caused a slight strain on our virtue.

CBS, that fearless giant of the ether, foe of sham and flimflam, is starting a documentary series on how the complex, changing world of today affects we mortals who have created it. An interview series with Douglas Edwards as moderator, the first program had six crime victims describe how they felt and acted before and after being attacked. It is a program for people who like and are interested in other people. The title? FYI, or, as CBS explains, For Your Information.

Dreams come true dept.

For those who are always chasing rainbows, Itek Corp. has an answer. It will build one, similar to one created for the Charles Hayden Planetarium in Boston.

A lantern slide 3¼ x 4 contains a rainbow. The slide was made by splitting a beam of light through a water prism and photographing it. The "secondary rainbow" was made the same way except that the strip was turned upside down. Exposure was cut, so that this second one would be dimmer than the first rainbow. The rainbow slide is projected onto a convex mirror which "sprays" the rainbow over the dome.

The regional New York office of Houston Fearless is now in the General Motors Building, 1775 Broadway (at 57th St.), New York 19, N. Y. The manager is Louis J. Girola.

Requiem for a glug glug

An "anti-glug" device is not a prohibitionist's weapon to stamp out glug drinking (glug being a hot toddy type of drink much favored for winter parties, of Scandinavian origin, we believe) but a funnel-type affair supplied by Kodak Ltd., Eastman's British cousins. Supplied on gallon jugs of liquid chemicals, it allows air to enter the bottle so that pouring become smooth and splash-free. FYI, always fearless, hereby takes a stand in support of anti-glug devices.

One of the biggest book sellers in the country is the Supt. of Documents in Washington, purveyor of government publications from Aadvark, How to Make a Pet Of, to Zygotes, Study Of. Their latest is *Preservation of Documents by Lamination* by Wilson & Forshee. Giving the latest authoritative information, this National Bureau of Standards Monograph No. 5 is 20¢, the fifth part of a dollar. Send remittance to Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.

America's Many Faces

A search for photographs to portray "America's Many Faces" is starting Feb. 1, to last until May 31. Directed by Edward Steichen, director of photography at the Museum of Modern Art and organizer of "The Family of Man," the project will dramatize the multi-racial character of America. It is expected that both an exhibit and a book will result from the search. Photographers are invited to submit prints, either color or black-and-white, from 4 x 5 to 11 x 14. Entries should be mailed to America's Many Faces, National Urban League, 14 East 48th Street, New York 17, N. Y. Payment of $50 for each picture and $250 for each series accepted will be made, a series being five or more photographs.

Drowning in a sea of crankshafts

Our contributing Technical Editor Lloyd E. Varden devotes himself to his activities as a professor at Columbia University, consulting work and photographic writing these days, but for a number of years was the technical director of a nationally known color finishing plant.

Digging through a file of Vardenia we found this story to tell on the good professor. He wrote it for a technical journal a few years back reminiscing on ten years experience in color photofinishing:

(*continued on page* 10)

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The one camera which has virtually every feature that the most skilled and creative photographer will ever need...

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Illustration shows camera with accessory Multifocus Viewfinder

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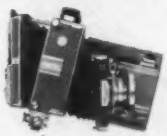
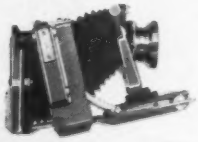


Lateral Front Shift, right or left, and front swing up to 15° right or left.



Front and Back Tilts (or swings) for correction of perspective or greater depth of field.

KLING PHOTO CORPORATION, 257 Park Avenue South, New York 10, N. Y.

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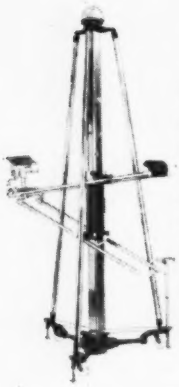

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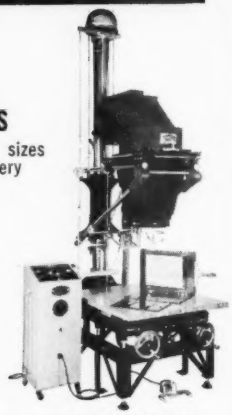

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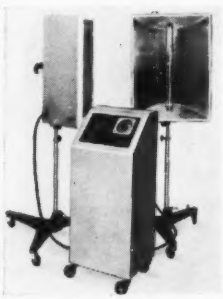

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F. Y. I.

(*continued from page* 8)

"A large tank of a wetting agent solution was dumped down the drain causing vast quantities of foam to develop and back up through the sewer line that was common to our laboratory and an automobile parts company next door. Thousands of small auto parts were submerged in a sea of foam, for which we were responsible. We paid for the clean-up labor, etc., and swore that such a thing would never happen again. Wetting agent solutions were from then on dumped slowly along with a stream of water. But about a year later a new man was put on this particular processing machine who had not learned of the foam incident. The first time he dumped the wetting agent tank the auto parts company was again engulfed in foam, practically to the ceiling.

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Hyzer on high-speed

Among PMI's more constant contributors is William Hyzer (represented this month on page 71) a specialist in motion analysis. A physicist, Hyzer is now a consulting research engineer after having been with Parker Pen as their Chief Physicist. He has degrees in both electrical engineering and physics, served with the Navy in the Pacific during World War II. Among his projects is a book *Photographic Techniques of Motion Analysis: A Handbook for Scientists and Engineers*, due from Macmillan shortly. In between books and articles, Bill Hyzer solves other peoples' problems, including high-speed motion studies, and is active in SMPTE, SPIE and other professional groups.

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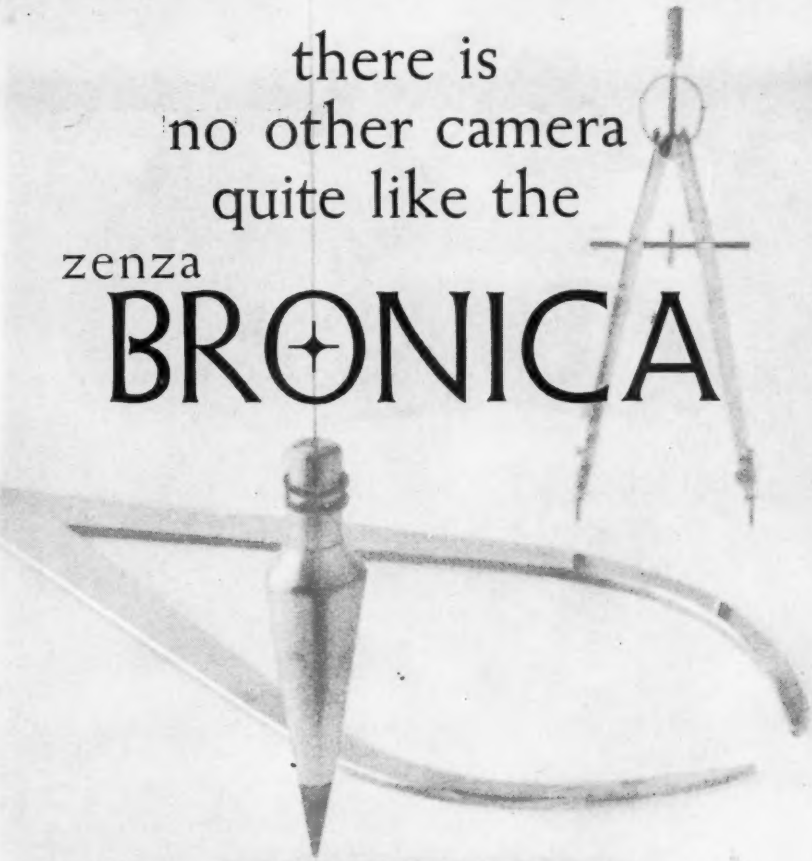

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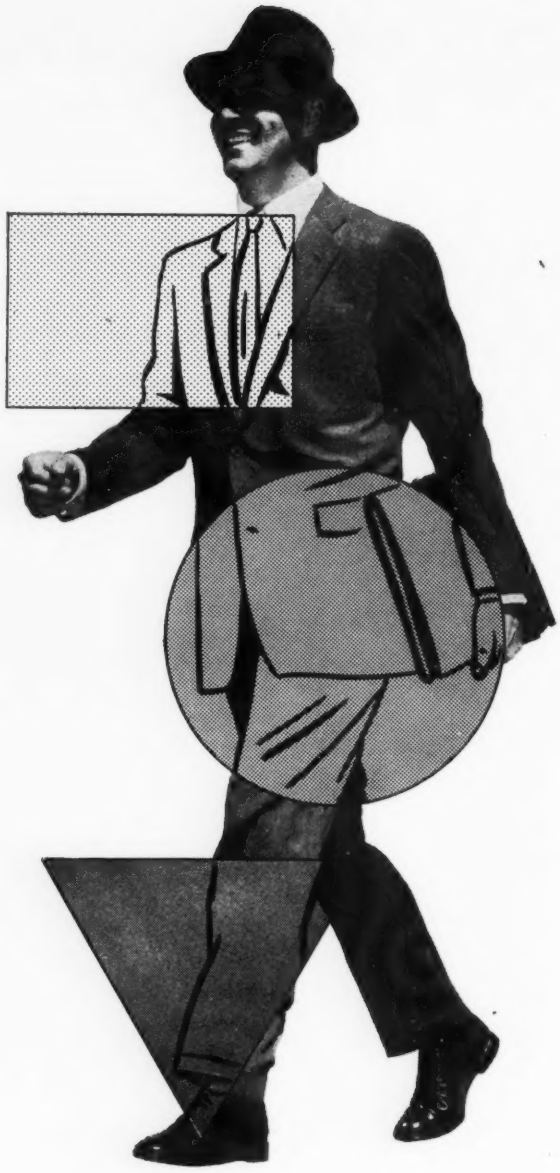

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LETTERS

To the Editor:

. . . In connection with its business in photographic chemicals, the FR Corporation adopted the trademark ONE SHOT and duly registered the trademark in the United States Patent Office on October 24, 1939 under Registration No. 372,179. The registration was renewed earlier this year and is, of course, in full force and effect. . . .

On page 75 of the December, 1959 issue of *Photo Methods for Industry* the term "One Shot Developer" is used in a descriptive sense. It may very well be that such use was made in ignorance of my client's rights. I am writing, therefore, to give you formal notice of the fact that ONE SHOT is a registered trademark, that it is not a descriptive term and that it may not be used as a descriptive term in your publication since such use is a violation of my client's rights. . . .

William R. Liberman
New York, N. Y.

To the Editor:

Reading FYI as we were browsing back in the October issue of PMI has caused us to make a firm resolution never to get into the editorial business. We thought our job had its pitfalls and heartaches, but it is clearly a bed of roses compared to editing a trade journal and, in particular, subjecting oneself to the abuse involved in publishing a directory of commercially available products.

Your column also brought to mind the fact that in the November issue of PMI, you published a directory of dimensionally stable materials and did not include our entries in this field. This, we feel, is obviously a serious omission, depriving your readers of access to an outstanding product, etc. Anyway, here are data on our Durazon and Sensitized Mylar: *Durazon:* Pen & Ink surface on mylar base; Cost per square foot, $0.00235; Thickness, .003 in. Translucent. *Sensitized Mylar:* Diazo coating on mylar base. Cost per square foot, $0.00325; Image color, black sepia; Thicknesses, .003 and .005 in. Translucent. Both types in all standard roll and sheet sizes.

Yours without garlic and with best wishes for happy editing.

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REPRODUCTION TRENDS

To prove how a POST Tuf-Tex print stands up under wear and tear, we put one through the washing and drying cycle of this automatic laundry equipment. The print did not tear, lines remained crisp and black, it gave excellent reproduction as an intermediate.

"Locked-in" black image on polyester film is virtually indestructible

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COMING UP

FEBRUARY 18-20 National Audio-Visual Association Conference, Shoreham Hotel, Washington, D. C.

MARCH 21-25 MPDFA Convention, Keil Auditorium, St. Louis, Mo.

APRIL 19-21 National Microfilm Association Convention, New York, N. Y.

MONTHLY MEETINGS

FIRST MONDAY • Rochester Chapter of SPSE. Contact Woodlief Thomas, Jr. Color Technology Division, Building 65, Kodak Park, Rochester 4, N. Y. CO 6-2500, Ext. 3784.

FOURTH MONDAY • Rocky Mountain Industrial Photographers. Contact P. H. Broadie, 2170 S. Lincoln, Denver 10, Colo. Telephone PEarl 3-2200.

LAST MONDAY • Southern California SPSE. Contact Ben Augustine, 235 Annandale Rd., Pasadena 2, Calif. Telephone MU 1-0076.

THIRD TUESDAY • Binghamton Chapter of SPSE. Contact H. G. Morse, Ansco, Binghamton, N. Y. RA 2-4221, Ext. 573. • Industrial Photographers of Southern California. Contact Janet Marshall, Executive Secretary, 5463 Virginia Ave., Los Angeles 29, Calif. HO 5-6614. • Southern California Industrial Photographers. Contact Janet Marshall, 5463 Virginia Ave., Los Angeles 29, Calif. HO 5-6614.

SECOND & FOURTH THURSDAY • Industrial Photographers Association. Contact Tom Holbarton, 181 Lake Drive West, Packanack Lake, Wayne, N. J. OX 4-2058. Or R. Handley, The Port of New York Authority, 111 8th Ave., New York 11, N. Y. AL 5-1000, Ext. 605. • (Second Thursday) National Visual Presentation Association, Inc. Contact M. E. Schack, 19 West 44th Street, New York.

If you wish to have your organization's meetings listed in future issues send the necessary information addressed to **COMING UP, PMI,** *83 West 60th St., N. Y. 23, N. Y.*

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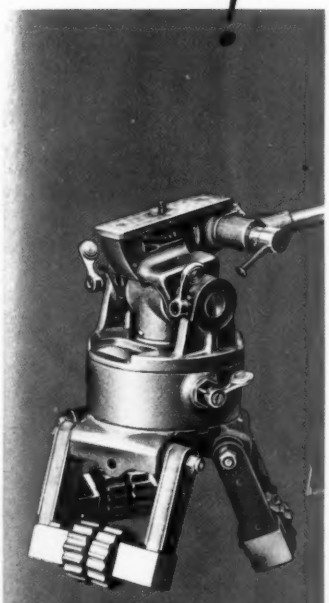

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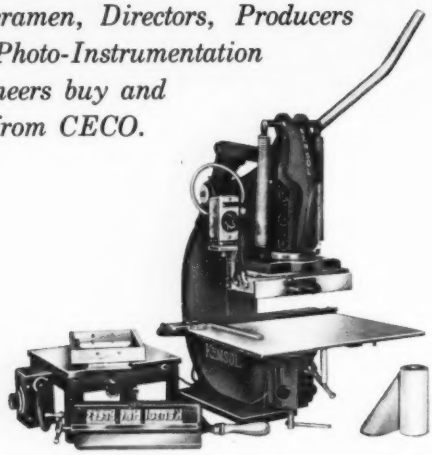

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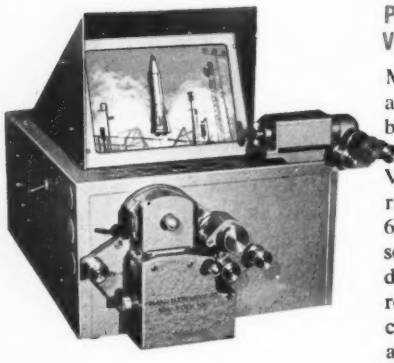

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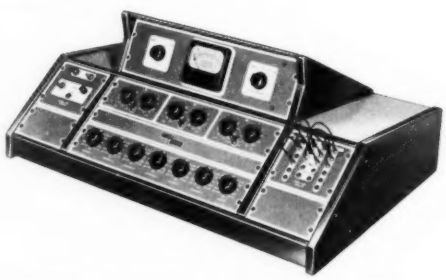

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INDUSTRIAL MOTION PICTURES

Film production in Puerto Rico as part of "Operation Bootstrap"

I have just returned from Puerto Rico where I spent a wonderful week visiting with my old friend, Benji Doniger and his charming wife Margot. Benji, who is the top movie camera man and director on the Island, has a beautiful home in Rio Piedras. He has been a resident of this island paradise since 1948. However, he has been involved with film there since 1928, so he knows just about all there is to know about Puerto Rico and film making there.

A most interesting movie project on the island is the film program section of the government's Community Education Project. Its function is to make educational films on various problems which confront the rural population. These films are projected by field workers at open air meetings. Each film deals with a specific problem of interest to the specific community. Each film showing is followed by a discussion of the theme of the film. Some films deal with health problems, such as why water taken from the creek should be boiled or an exposition of malaria control. Other films deal with improving personal living, such as showing how a group of neighbors can dig their own well so that water need not be carried for miles from a distant supply or explaining how a community built their own bridge across a stream that periodically swelled up after a heavy rains, making foot crossing dangerous. Some films deal with domestic peace, one explaining why a husband should help his wife around the house (a practice not very widely accepted in Latin countries).

Films for community education

The Community Education Film Project was organized in 1948 and spearheaded by three New York film makers, who were invited to the island by the Governor. Benji Doniger was one of them. They had a twofold function. One was to make the urgently needed educational films; the other, to train native Puerto Ricans in every phase of film making, from writing to the laboratory techniques of printing finished release prints.

They succeeded in both directions. The films they made not only produced visible and practical results, but also achieved artistic success. A number of them have won international film awards. They also were successful in training Puerto Rican cameramen, directors and technicians to a point where the original American organizers could leave the project and be replaced with fully-trained, native film makers. Fred Whale, an American educator, is presently in charge of the community education program. This includes, in addition to the film unit, an excellent graphic arts department.

During the last decade, the Community Education Project built a fine sound stage which is large enough to accommodate a complete set. This is very necessary in Puerto Rico when one wants to shoot sound. Although there is an abundance of beautiful locations for shooting, it is hard to find a spot quiet enough to record sound. When direct sound must be recorded, all shooting is done on a sound stage. All the movie equipment is quite up-to-date, and the very best available, from a crab dolly to an N.C. Mitchell.

Next to the Community Education Project, the most important movie production group is Vigue who, with the help of Fomenco, has built a first class studio and a processing laboratory for both 16mm and 35mm films. At present, this is the only sound stage available for rent to outside film makers. It is not as large as the government's studio, but it is adequate for modest production. The management is most cooperative with independent film makers. They have editing facilities, and their processing lab does excellent work. Fomenco, which helped Vigue build

(*continued on page* 18)

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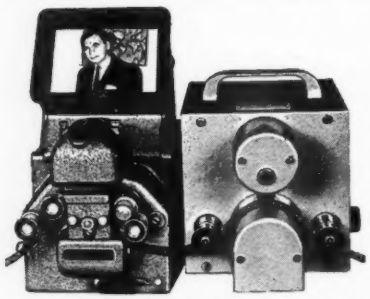

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IND. MOTION PICTURES

(*continued from page* 17)

the studio, is the heart of "Operation Bootstrap". To induce desirable industries from the states to make their home in Puerto Rico, they offer a ten-year federal tax exemption. They will build a plant to specification which the industrialist can buy from the government on an installment plan. The government will help train workers, and will cooperate in many other ways to induce and encourage various industries. The Puerto Rican government considers film production a desirable industry.

On location—beautiful, but noisy

In addition to the government help, Puerto Rico offers the film maker a great many attractions. It has a wonderful mild climate, winter and summer. The temperature seldom goes above 80 or below 70 degrees. If you don't like a cloudy sky, just wait an hour or so, and the sun will be out. As to locations, there is hardly a spot on the island that is not photogenic. Within a few miles, you can have great variety of scenery; breathtaking green mountains, fertile coastal plains, historic old buildings, tangled jungle, or a modern city with six-lane roads. Only a stone's throw away from the historic century-old city one sees fascinating modern architecture in the new homes and hotels built during the last few years. There is hardly a location set-up that can not be found on this island.

An ever-increasing number of film makers who are interested in a single production come to the island to shoot. These include documentaries, industrial films, television shorts, television commercials, and some full-length feature films. If you plan to do some shooting in Puerto Rico, it would be wise to make some advance preparations. Get some information about such items as extra local crew, and equipment rental. There are quite a few trained film technicians, from director and cameraman to electrician and sound man; but most of these have permanent jobs on the five television channels and government projects. Too, there is only a limited amount of equipment available. So before making definite plans, find out what will be available at the time you plan to shoot. There are some people in Puerto Rico who can work as production expediters and can be of great help to film makers who plan to work on the island. Send me a card if you are interested in further information.—THE END

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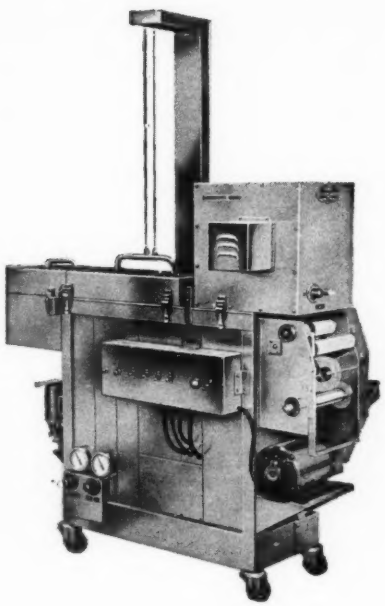

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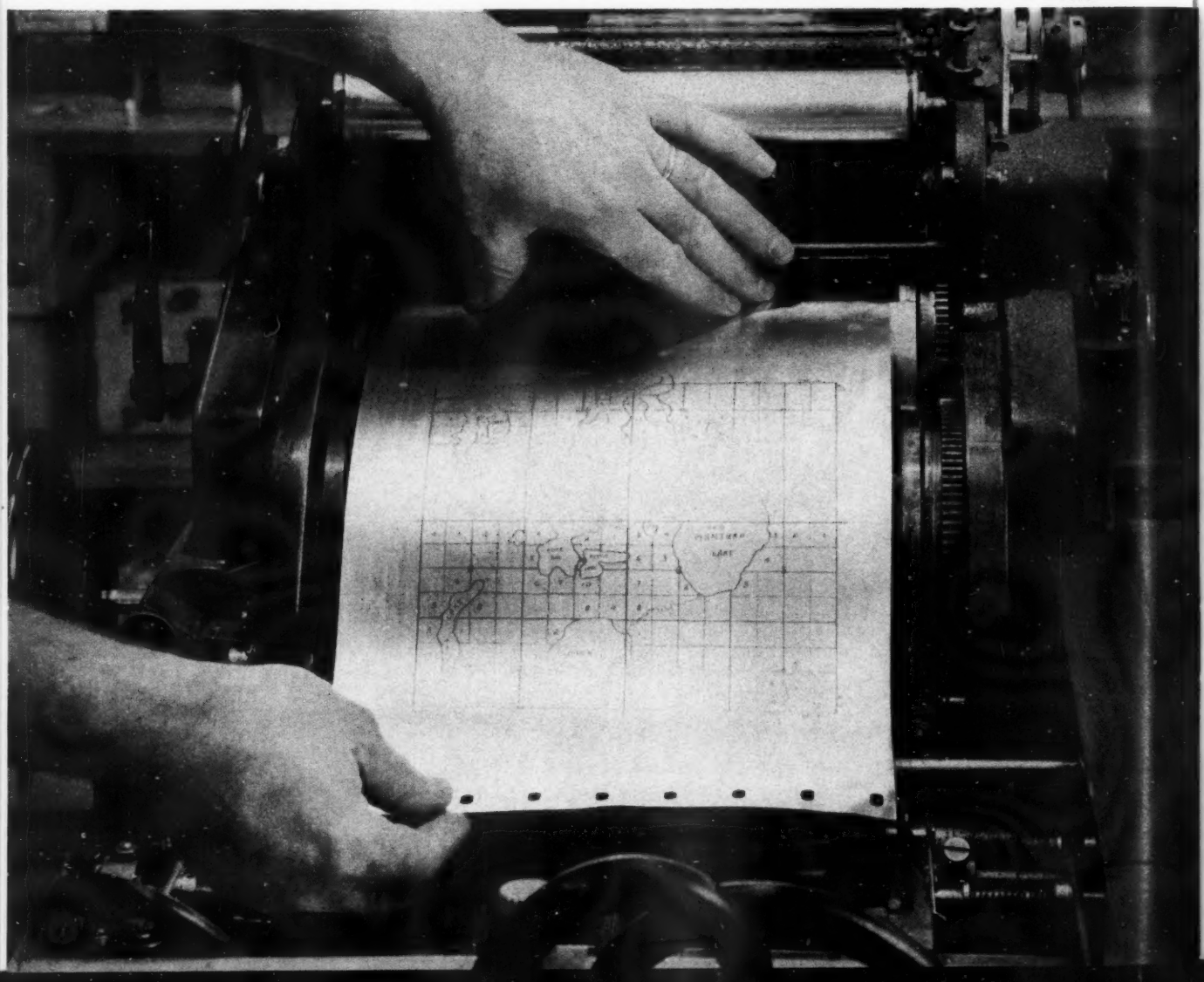

by Vernon D. Tate

MICROREPRODUCTION

Vatican Film Library and special facilities housed at St. Louis U

On November 22, 1959 the beautiful and in some respects unusual Pius XII Memorial Library was dedicated at Saint Louis University. Esthetically the six tier edifice with space for 1,000,000 books and 1500 readers is exciting. Contemporary architecture makes full use of many new materials and employs color and texture to produce, as in this instance, strikingly photogenic effects. The library houses all of the University collections for instructional and research purposes, but the fact that renders it unusual, and distinctively apart from the many other new libraries being built today, is that it is the repository of the monumental Knights of Columbus Vatican Film Library, of microfilm reproductions of priceless manuscripts the originals of which are housed in the Vatican Library in Rome. Special facilities for the custody and use of this collection are an integral part of the new library and the building was designed around these requirements. It therefore represents a long step toward the ideal of the Microfilm Library which will become at some time, perhaps in the not too distant future, an accepted commonplace.

The Knights of Columbus Vatican Microfilm Library began in 1950 when the Rev. Lowrie J. Daly, S. J., a teacher of medieval history at St. Louis University sought to increase the store of research material available to students in America. He was also moved by the desire to insure the preservation of priceless orginals against destruction by any natural or man made contingency. The Vatican Library is one of the greatest in the world and its manuscript treasures are irreplaceable. If during World War II it had been damaged or destroyed as could easily have been the case, the loss to civilization would have been incalculable.

When permission to microfilm had been granted by the Vatican, and financial problems remained before a beginning could be made, the Knights of Columbus came forward and agreed to finance the entire undertaking. Work began at once. Monroe E. Brand of Graphic Microfilm in New York, and Edward T. Freel then of Remington-Rand, became technical consultants for the project. The equipment needed was not too difficult to specify but with the Korean War then in progress it was hard to acquire and not easy to transport. Eventually ten Kodagraph flat bed cameras, two continuous processors, film printers, readers for inspection and all other necessary accessory equipment was procured and installed. For almost a decade the program moved steadily ahead. Statistically the results are interesting. Some 30,000 codexes or manu-

(*continued on page* 22)

If you haven't tried 3M BRAND Type "L" plates ••order a package HERE••NOW

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CITY_____
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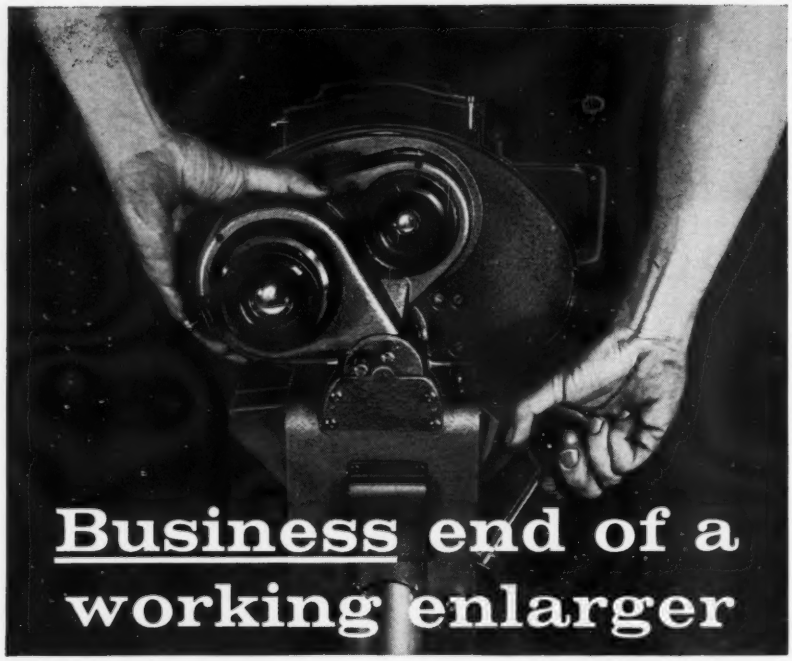
Get more information. Circle 456, page 85



Business end of a working enlarger

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With just a twist of the wrist you automatically change lenses and condensers simultaneously to accommodate negatives from 35mm to 2½x3½".

A self-masking negative carrier and factory-fitted 50mm and 105mm Schneider Componar or Componon lenses are standard equipment.

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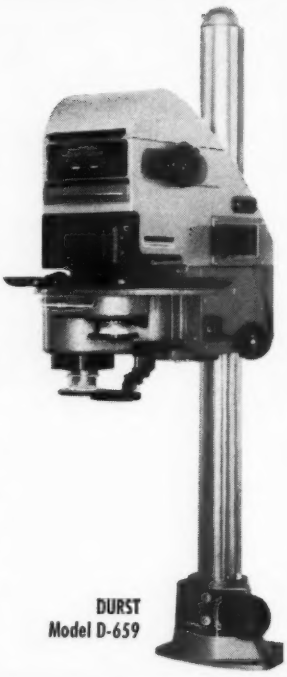

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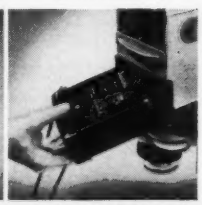
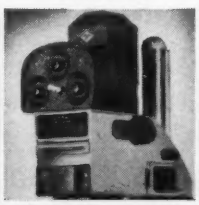
Self-masking negative carrier for all film sizes including 70mm

Accessory COLD LIGHT unit replaces condensers



Accepts Agfa variable color filter head



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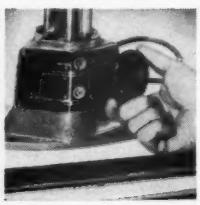

Get more information. Circle 425, page 85.

MICROREPRODUCTION

(*continued from page* 21)

script volumes were microfilmed. Since each codex may contain from one to 40 documents or books the total number of titles lies in the hundreds of thousands; the total number of pages exceeds 11,000,000. The negative required 8,720 rolls of 100 ft. each or 872,000 ft. Two positive copies were made, one to remain in the Vatican Library and the other for shipment to the United States. They required something more than a million and a half feet of positive film. The shipments to the United States were made in specially constructed boxes containing 41 rolls or 4100 ft. These have been arriving at the rate of two boxes every three weeks for the past several years.

The Vatican Microfilm Library Reading Room is both the heart of the Library and the permanent American home of the microfilm collection. With its related offices, catalogue space, storage room and vault the area constitutes probably the largest single operation within the library. Although the entire building is air-conditioned, special additional facilities have been provided to control temperature and humidity in the microfilm section. There are ten microfilm readers each of which is equipped with a special desk to facilitate the use of the materials. The positive films are stored in cabinets when not in use; the negatives are kept in a vault. A complete laboratory has been set up in the basement for use with the microfilms. Many volumes including the Vatican Printed Library Catalogue are kept in the reading room and more than 250,000 manuscript catalogue cards from the Vatican Library are also available here.

The codexes reproduced by the project are fascinating. They record over 2000 years of human progress in every field, including history, philosophy, art, music, law, science, engineering, mathematics and many others. The fact that they have survived down to the present day is remarkable, but the fact that through microfilm their contents have an infinitely greater chance of continuing into the distant future is more remarkable still. Man is a record making and using creature. His progress is based in no small degree on his books and records. If and when these are lost, his progress will grind to a halt. If all of our books were destroyed today, the contents of the Encyclopaedia Britannica could not

(*continued on page* 24)

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1 VERSATILE LITHO EMULSION ON 2 SUPPORTS

CRONAR ◈ ORTHO A is on Du Pont's tried and proven polyester film base. It's available in either .004" or .007" thickness. Use it when you need a film with wide exposure and processing latitude, hard halftone dots and a tough, rugged support with exceptional dimensional stability. Important note: Many shops report that this is the *only* film ... the *only* emulsion ... that can be used successfully in the increasingly popular "bump exposure" technique.

ACETATE ORTHO LITHO FILM on .0055" acetate base has the same superior high-contrast emulsion as CRONAR ORTHO A coupled with special surfaces which minimize Newton's Rings and trapped air in plate-making. Use it for those jobs which require scoring, cracking, extensive scribing or knife etching.

Standardize your litho film requirements with these two films. Both are exposed and processed alike. Your Du Pont Technical Representative will be pleased to demonstrate their advantages right in your own shop. E. I. du Pont de Nemours & Co. (Inc.), Photo Products Department, Nemours 2430-A, Wilmington 98, Delaware. In Canada: Du Pont of Canada Limited, Toronto.

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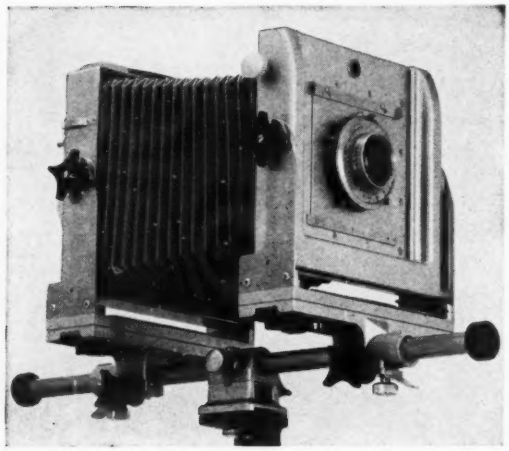
calumet all-metal 4x5 view camera



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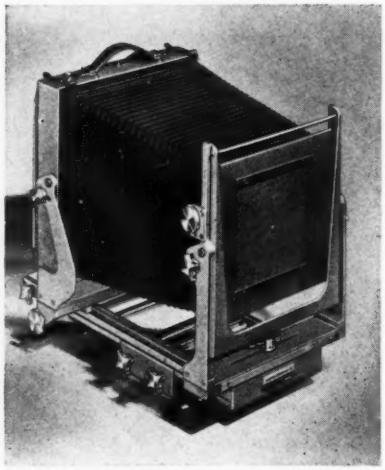

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Get more information. Circle 415, page 85

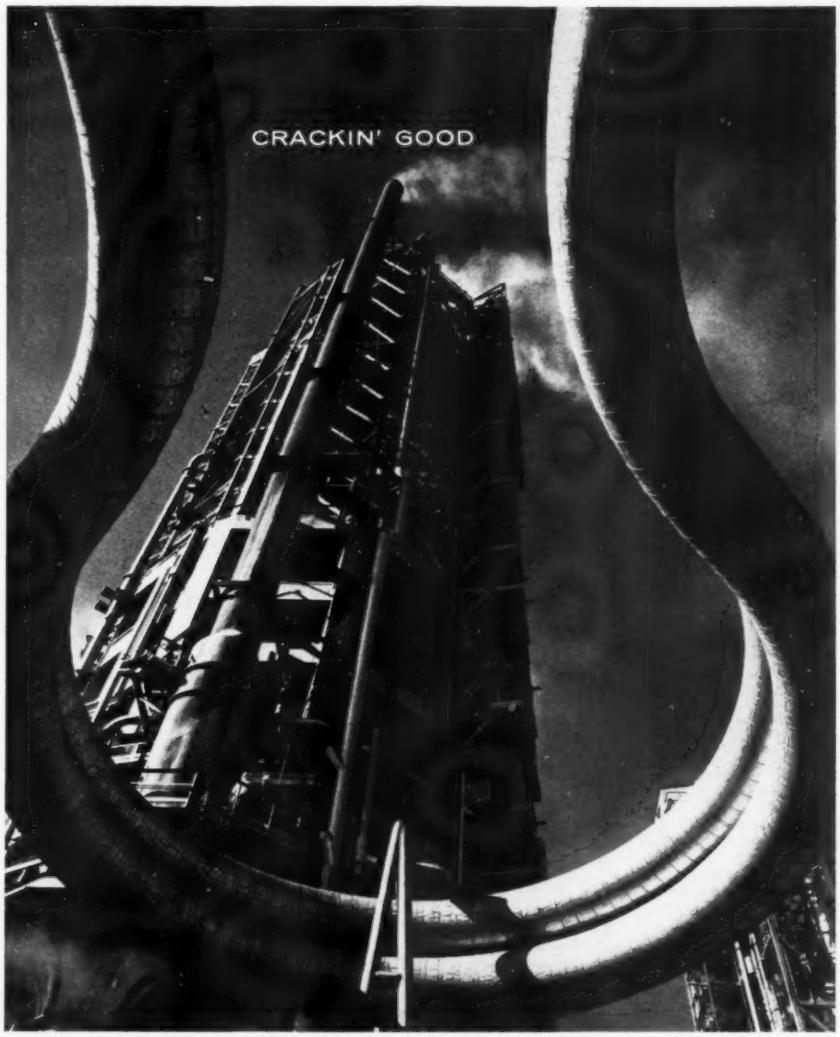
MICROREPRODUCTION

(*continued from page* 22)

be recreated from the united memories of living men. This is why books and records are important and why microfilm as a technique of preserving them and making them more readily available for use is worthy of study and application.

Vast as the project of microfilming manuscripts and now early printed books in the Vatican Library may be, there are even greater though less spectacular problems of documentary reproduction demanding solution with the penalty for inaction irreparable loss. In this instance it is not war, fire, insects, flood or many other like catastrophies that threaten but rather the slow steady and deadly peril of chemical deterioration of paper. Good rag paper is relatively permanent; some examples 500 or more years old are still in excellent condition. About 1860, however, progress began to be made in producing paper from chemically treated wood pulp. Two decades later this paper came into widespread use usually for newspapers and other printing requiring relatively cheap paper stock. While good wood pulp paper can be made, it is expensive and many hundreds of thousands of books, scientific and other magazines were printed for one reason or another on impermanent paper stock. Some of these have long since disintegrated. When about 25 years ago the World War I volumes of *The New York Times* were microfilmed on 35mm microfilm for preservation the resources of many libraries were ransacked to provide copies in good enough condition to film. It is extremely doubtful whether like issues could be found and brought together today. Newspaper filming is now almost universal and over 500 newspapers and many back files now exist in, and in some cases only in microfilm form. There is a *Union List of Newspapers on Microfilm* published by the Library of Congress. Books are another matter. They deteriorate at greater or lesser speeds depending on conditions of storage and use but they will deteriorate and some day librarians may find themselves housing only crumbling shreds of what once were the records of science, humanities or in fact of any field. Proper preservation of books and periodicals of this period is a demanding necessity and in libraries is preservation problem *number one*. At the same time the situation could also be described as library microreproduction opportunity *number one*.—THE END

Industrial photographs come to life on HALOID® photographic papers



From 11th Annual Graflex Photo Contest—Robert Dixon, Beaumont, Texas

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HERBERT P. PASCHEL

REPRODUCTION & GRAPHIC ARTS

Questions and answers on some particular topics of interest

From time to time, readers write in to get additional information on points overlooked or inadequately covered in the column. Here's a round-up of inquiries of general interest not previously published.

Q: I would appreciate some further information on making screened prints (Veloxes). Should one use a magenta or grey (neutral) contact screen in projection printing? Can dodging be done? What about the various grades of paper used in making good prints from difficult negatives?
F.T., San Diego, Calif.

A: My personal experience with projection printing of halftones has been with magenta screens but others are obtaining equally good results with grey screens.

Dodging can be done but it is tricky. You must be able to control dot size without sacrificing dot density. Obviously, a screened print with inadequate dot density may be difficult to rephotograph without distortion of the tone values.

You cannot use various (contrast) grades of paper for making halftone prints in the same manner as you can in making continuous tone prints. Screened prints must have maximum contrast between the dots and the clear areas. Since the screened print is only a means to an end its visual appearance is of no significance. With soft papers you may get what appears to be a better print but the dots may be grey and the white spaces veiled. This would be extremely troublesome when making the line pick-up (rephotographing), with consequent distortion of the tone values.

Q: Your article on the dimensional stability of photographic supports is an interesting summary of a subject of considerable importance to me. There is one point on which I am seeking information. I have heard rumors from a number of sources that there is a process whereby the inherently high dimensional stability of polyester bases is further improved. Have you any information on this?
G.F.G., Los Angeles, Calif.

A: After considerable searching I could unearth nothing new or secretive in regards to improving dimensional stability at the point of use. The survey indicated that most users were following techniques similar to those suggested in the article.

One process that does improve the stability of polyester bases is a heat treatment that relieves stresses within the film and thus minimizes further changes during use. But this is done as the concluding step in the manufacture of the base, or as a preliminary step prior to coating the emulsion. This treatment, however, cannot be applied to finished photographic film since the temperatures involved would impair the emulsion.

Q: I am interested in obtaining a book concerning halftone photography. Those that I have seen were published many years ago when the lens cap was used to control the exposure. Is a modern text available that explains the methods used today?
K.L.H., Chicago, Ill.

A: You are quite right that a lot of literature on the halftone process is antiquated. In addition, there are relatively few textbooks devoted exclusively to the subject.

In connection with contact screens, the best sources of information on that method of making halftones are the booklets and pamphlets issued by the Eastman Kodak Co.

The following are some books published within the last ten years which contain helpful chapters on halftone photography.

The Lithographers Journal (1958), Waltwin Publishing Company, 317 W. 45th St. New York 36, N. Y.

(*continued on page* 28)

This Fixer lasted so long in my tray I could hardly believe it!

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CONCENTRATED LIQUID
FIXER

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Order a carton of Flash-O-Graph from your nearest Hunt Branch. If it doesn't do all we say it does, write to the same branch for return instructions, and we will refund the full purchase price and shipping cost.

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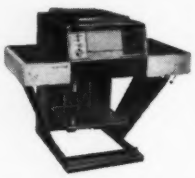
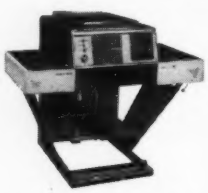


KENRO "VERTICAL 24" shoots up to 18" x 24". . . the four-up camera



KENRO "VERTICAL 18" shoots up to 14" x 18" . . . the two-up camera

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The new Kenro "Vertical 14" Companion is the first true office-type camera. It goes hand in hand with new paper platemaking and photocopying systems recently introduced. It quickly makes exposures in daylight or darkroom up to 11" x 14". Interchangeable heads are available for all Kenro cameras for making all types of exposures including line and halftone negatives, xerographic exposures, one-shot photocopies and matrix transfer masters.

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GRAPHIC ARTS

(*continued from page* 26)

Photomechanics and Printing (1957) J. S. Mertle & Gordon L. Monsen, Mertle Publishing Co., Chicago, Ill.

Modern Illustration Processes (1950), C. W. Gamble, Pitman Publishing Corp., 2 W. 45th St. New York, N. Y.

A simple, practical down-to-earth treatment of the subject was published earlier this year.

The Magic of Making Halftones (1959), K. W. Beattie, Modern Lithography, Box 31, Caldwell, N. J.

Now in preparation and scheduled for release early in 1960 is *Halftone Photography, No. 508*, one of the series of skilled craft texts published by the Lithographic Technical Foundation. This will be a completely revised edition and promises to be up-to-date.

Q: In my job as a photographer for an industrial firm I also make radio dials using the photo resist method on metal. Now I have received a job which calls for black dials on lucite, using edge lighting for illumination. These dials must be resistant to any solvent used to clean them. Can you give me any information on how to make such dials?

D.J.F., Silver Springs, Md.

A: That bit about *any* solvent could be a real stumbling block. I'm sure the specifications are not as rigid as all that. In the first place, I do not know of any plastic that is totally resistant to any and all solvents. And of the possible image materials very few, if any, could withstand such rigorous treatment. You better check on the cleaning requirements before you try to do the impossible.

You could have a photographic emulsion coated on lucite and then make your dials by contact or projection printing. Another possible way is to expose the dial image on stripping film and following processing laminate this to your plastic base. In both cases the image could be protected by spraying with a lacquer or other plastic that meets the cleaning requirements.

A prepared product for making dials, reticules, etc., is also available as Kodak Photoplast Plates. These are an extremely high-contrast line emulsion coated on an optically clear Plexiglass base. The material comes in thicknesses of 1/16, 1/8 and 1/4 in. in any desired rectangular shape from 4 x 5 to 20 x 24 in. Further details may be obtained by writing Eastman Kodak Co. Special Sensitized Products Division, Rochester 4, New York.—THE END

New Kodak Ektalith Loader-Processor, teamed up with office-type camera, brings the speed, quality and flexibility of camera copying to "paper platemaking"

Now...make offset paper masters photographically *in full roomlight!*

Imagine producing 10 high-quality offset masters—reduced, enlarged or same size—in 10 minutes. And doing the entire job next to your duplicator.

Kodak's Ektalith Loader-Processor brings this *unmatched* convenience to your office—gives you all the savings of *revolutionary* Ektalith method.

This ingenious unit, which serves as a "desk-top darkroom," is used to load high-speed Ektalith Transfer Paper for exposure to camera . . . and to process the exposed sheet. Attached Ektalith Transfer Unit puts the image on a paper master which gives you hundreds of sharp duplicator copies of line work and a variety of halftones.

Costs are surprisingly low. New Ektalith Loader-Processor with Transfer Unit costs less than $600. Uses inexpensive paper masters and materials. *And anyone can do the job!*

Free booklet explains Ektalith Method in detail—how it's also used to produce 10 or more direct copies without "platemaking"; as well as enlargements from microfilm. *Phone your local Kodak Ektalith dealer or write* Eastman Kodak Company, Graphic Reproduction Division, Rochester 4, N. Y.

Price is list and subject to change without notice.

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Coming! For the First Time!

PMI DIRE

THE PMI DIRECTORY will be the only centralized Reference and Buying Guide in existence for the inplant photographer, the reproduction engineer, and the many technical and engineering personnel who apply photo and repro methods in their work. Up until now, information on products, services, materials, etc. has been available—but in a widely scattered form. There were losses both to the man doing the work and to the manufacturer or service supplying the need.

A working tool such as the PMI DIRECTORY has long been asked for in the field. Now, at last, the need and the want will be filled. Under one roof, the PMI DIRECTORY will provide an up-to-date, all-inclusive listing of essential information pertaining to the vast industrial market in all its branches. Equipment . . . Materials . . . Manufacturers . . . Services. Everything will be at the fingertips of the user, assorted and classified. It will be accurate, authentic, reliable – produced as a helpful service by the Editors of PMI magazine.

EQUIPMENT – MATERIALS – MANUFACTURERS – SERVICES

All Classified and Catalogued for Quick Reference

The Editors of PMI have been working many months in order to make the PMI DIRECTORY a useful and valuable reference work and buying guide. It will be the only meeting place of its kind for buyer and seller. It will include names and addresses of manufacturers and services . . . trade names . . . product and service listings . . . the famous PMI charts, diagrams, graphs . . . and other helpful information. It will serve as a home or office library for the man on the job, the purchasing agent, the department head, the technical personnel. Here will be a Directory of Who, What, Where . . . a "work-bench" reference with information unavailable in any other single source.

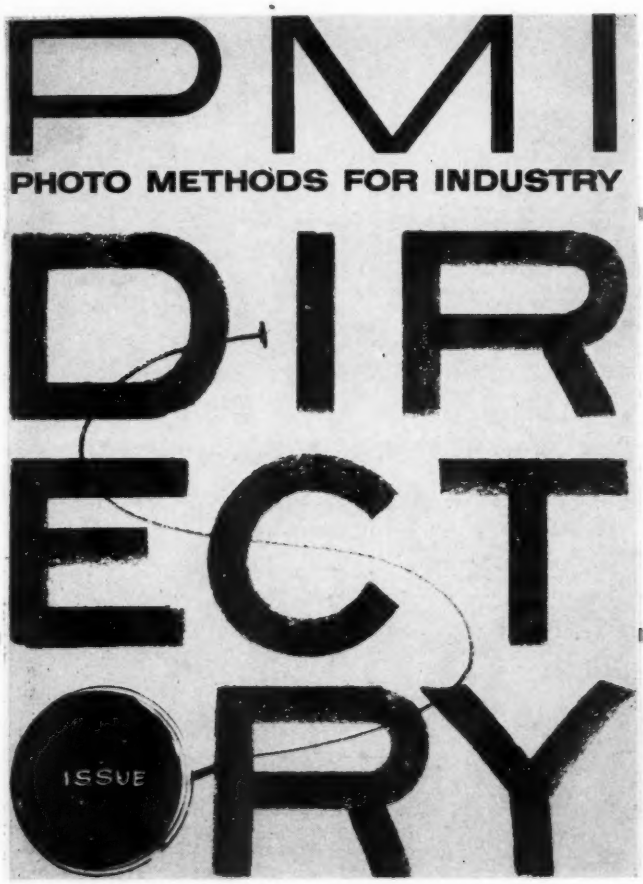
A BASIC REFERENCE WORK AND BUYING GUIDE

It makes no difference what branch he is in, there will be something helpful and useful in the PMI DIRECTORY for everybody: still photography, motion picture photography, photo instrumentation, reproduction, graphic arts, audio-visual, visual communications in all its phases. This will be the most ambitious ever undertaken in this field, and it marks another successful milestone in the history of PMI, preferred magazine of industry.

PMI DIRECTORY

RECTORY

An accurate, reliable, up-to-date reference and buying guide for the man using photo methods in industry and visual communications!



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HERE IS A PARTIAL LIST OF CONTENTS:

CAMERAS: 35mm, 70mm, motion picture, aerial, high speed, sequence, microfilm, oscilloscope, Polaroid, underwater and more, more, more.

MOTION PICTURE EQUIPMENT: cameras, processing units, lenses, dollies, editors, tripods — all that's needed for industrial cinematography.

PHOTO INSTRUMENTATION: cameras — high speed, panning, streak; sequence cameras, stop motion projectors—the latest and complete listing of this specialized equipment.

DARKROOM EQUIPMENT AND SUPPLIES: enlargers, chemicals, dryers, processors, sinks, densitometers, washers, everything for color and black-and-white processing.

REPRODUCTION: offset duplicators, presensitized plates, photo lettering machines, process films, chemicals. White Printing: diazo machines, papers, foils, films. Microfilm: cameras, readers, enlargers, printers, reels, cards.

GRAPHIC ARTS: process cameras, sinks, tanks, tables, trimmers, lenses, enlargers.

AUDIO-VISUAL EQUIPMENT AND SUPPLIES: sound-silent projectors, strip projectors, 16mm projectors, screens, stands, files, tape recorders, table top projectors.

FILMS: just all of 'em. For press work, commercial, graphic arts, microfilm, aerial, Polaroid, X-ray, etc.

HOW THE PMI DIRECTORY WILL BE DISTRIBUTED

The PMI DIRECTORY will be published in September, 1960. It will be distributed to readers of PMI—Photo Methods For Industry —as part of their subscription. If you are not a PMI subscriber, you can reserve your free copy of the PMI DIRECTORY by using the postpaid order card on page 85.

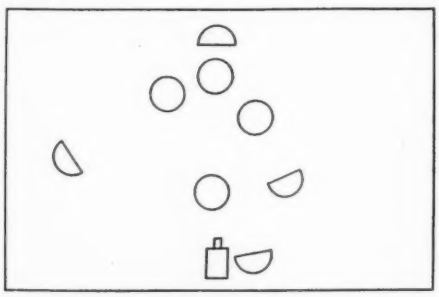
HOW WOULD YOU HAVE LIGHTED THIS PICTURE?

NEWS PHOTOGRAPHER LARRY GEORGE DOES SOME SHARP SHOOTING WITH G-E No. 5 FLASHBULBS

"My assignment was to photograph the actors in a high school Western play," writes staff photographer Larry George of the Indianapolis News. "I wanted a picture that would capture the mood of the play and show the principals in some dramatic way.

"It was late at night, during rehearsal. The only existing light came from a few overhead lights on stage. I decided G-E No. 5 Flashbulbs would be perfect for the job. I placed four of them on extensions, all sync on camera...three on the background group and one side-lighting the principal subject in the foreground.

"My camera was a 4x5 Speed Graphic with wide-angle lens, placed at floor level. Exposure 1/50, f22. G-E No. 5's again proved to be the perfect solution to a tricky lighting problem."



GENERAL ELECTRIC PAYS $50.00 upon acceptance of photographs illustrating difficult lighting problems you've solved with General Electric Flashbulbs. Send your picture with a detailed description to: Photo Lamp Dept., General Electric Company, Nela Park, Cleveland 12, Ohio.

GENERAL ELECTRIC

Get more information. Circle 431, page 85

AN EDITORIAL

ONLY PEOPLE NEED APPLY

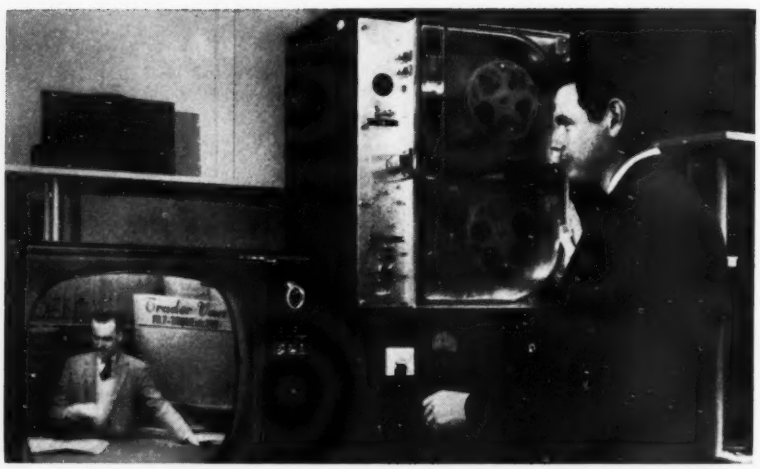
Following a journalistic custom of long standing, we try to stick to the facts in PMI stories and reserve our prejudices for this space. Thus it is that a "Memo on Hiring" within summarizes the consensus of an informal cross section of photo administrators as they expressed their views. One sentence sums up a great deal: "All things being equal, white shirts, short hair and shined shoes are highly favorable indicators." ● We have no argument with presentability, but something seems awry. Somebody seems to have pushed the wrong button on the card sorting machine. ● In many cases the newcomer is hired for end man in the flashgun brigade, a spot that commands little remuneration. At this wage level only beginners and riff-raff might be interested, and naturally the clean-cut beginner looks easier to live with. We're agin coolie wages in photography, but okay. All great photographers and photo technicians were once beginners. What appalls us is that indications of competence are so rarely mentioned, except to say that such as portfolios are looked upon with suspicion. We agree on the portfolio bit. We agree that a corporation employee should have enough savoir faire to make it through the day without ruffling tempers and stirring animosities. But among the people eager to break into photography, able to shine their shoes and capable of polite conversation, there is much diversity. Some are nice but mediocre. Some possess, and have shown, genuine talent as fledgling illustrators. Some have undergone four years of college training in the graphic arts and reproduction. Some have had some training in chemistry, engineering or journalism along with photographic skill. Effectively utilized, these backgrounds could make for better visual communications, more efficient photo installations and more useful technical photography. ● There is little evidence that such diverse qualifications are sought, or encouraged. Instead the temptation is to hire a replica of the present staff. However, in a department where all are cast from one mold weaknesses are duplicated. More capable photography calls for an assortment of higher skills.

The Editors

NEW IMAGE RECORDING SYSTEM

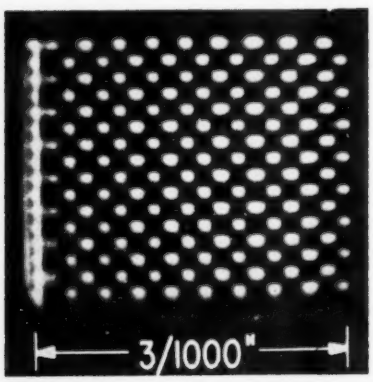
TPR

A new recording method invented at General Electric Co. is completely non-photographic. It combines electronics and thermoplastic technology to circumvent the necessity for any light-sensitive material — by Lloyd E. Varden



Thermoplastic record of a TV program is less than ¼-in. wide, can be viewed when light strikes at angle.

Inventor of process, Dr. William E. Glenn, is shown *(above)* making a record of video signal from local station received by ordinary TV set. The record is processed during recording 1/100 sec. after "exposure." Special adaptation of standard 16mm projector displays TPR image *(below)*, on ordinary screen.



Photomicrograph shows the capacity of TPR for storing information, which can be digital, analog or image. First applications will be military.

On Jan. 12, 1960, the General Electric Company officially unveiled a unique system of recording electrical signals that can be applied in many different ways. In its simplest form the method is used to store discrete electrical impulses, but when combined with an electron beam scanner complex patterns, including black-and-white or color images, can be recorded. Special optical elements are required for reconstructing such images for most purposes, however.

Basic principles of method

This new system of recording can be described as an electrophysical means for deforming the surface of a plastic layer in such manner that the deformations become optical correlates of the electrical input signals. Dr. William E. Glenn of GE's physics research laboratory, inventor of the process, refers to it as "thermoplastic recording" (TPR) and he calls the plastic deformations "ripples." He stated during the press conference at which the process was announced that the recorder itself has an electrical input similar to a magnetic tape recorder but that the image output is similar to photographic film.

The workings of the process can be visualized from the schematic drawings in Fig. 1. The lower drawing shows the general structure of the recording film. It has a thermoplastic layer coated on a transparent support. Not shown in the drawing however is an electrically conductive coating between the thermoplastic layer and the base which, supposedly, consists of an extremely thin metallic deposit.

When the plastic coating is scanned by an electron beam it acquires a distribution of negative charges according to the input signal characteristics. Since the film is continuously moving the electron beam has to scan the plastic layer in only one direction in order to lay down a charge pattern suitable for image recording. This single line scanning, plus the movement of the film, produce the equivalent of the horizontal and vertical scanning patterns used for television picture formation.

Immediately after the scanning step the film passes over a pair of radio frequency electrodes which function as a rapid heating device. The principle is the same as that employed in so-called dielectric ovens. The radio frequency energy is absorbed by non-metallic materials causing heat to be produced due to molecular friction, and the heating action can be extremely fast. As a matter of fact, in TPR the film passes over the R.F. heater in about 0.01 sec. Yet this is adequate for temporarily melting the thermoplastic layer, and with the plastic in the liquid state the negative charges can depress the layer toward the base because these charges are attracted to the ground potential of the conductive undercoating. The deformations in the plastic surface, or ripples, are "frozen" into the surface of the thermo plastic layer as soon as it cools, which takes only a small fraction of a second.

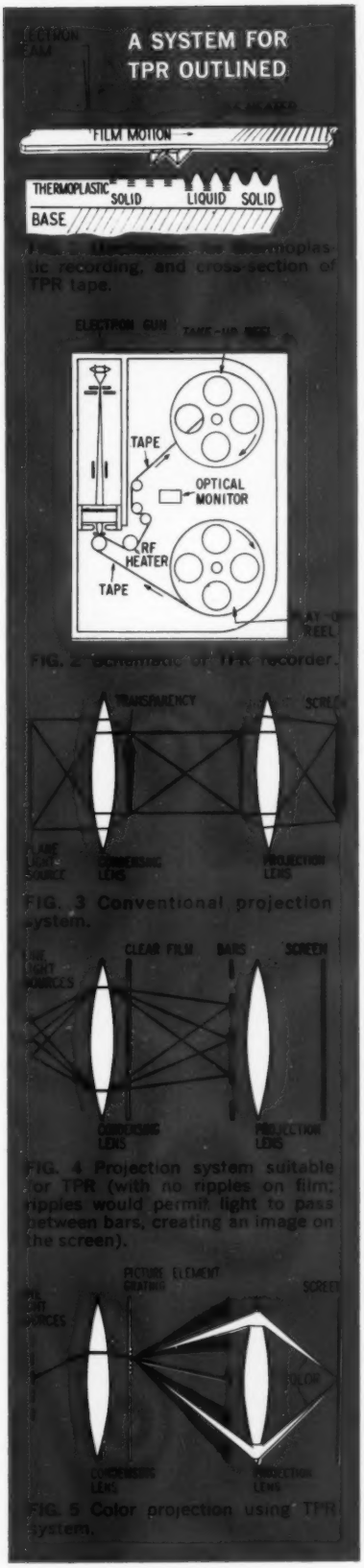


FIG. 1 Thermoplastic recording, and cross-section of TPR tape.

FIG. 2 Schematic of TPR recorder.

FIG. 3 Conventional projection system.

FIG. 4 Projection system suitable for TPR (with no ripples on film; ripples would permit light to pass between bars, creating an image on the screen).

FIG. 5 Color projection using TPR system.

Practical details

In actual practice, of course, the electron beam scanning is done in a vacuum. But, as Dr. Glenn pointed out, this is not much of a problem today. The equipment used for his demonstration was certainly simple enough in this respect. The electron gun, film reels, heater unit and optical monitor were all contained in a shallow-depth cabinet which had a hinged, transparent door that pressed against a rubber seal when closed. (*See Fig. 2.*) It required only about 1 min. to pump the air from the enclosure down to a vacuum sufficiently low for operation of the electron gun.

During the electron beam scanning, etc., the film moves at the rate of only 5 in. per sec., compared to 15 in. per sec. for videotape recording and 7½ in. per sec. for high-quality magnetic audio recording. Yet the resolution obtainable by the method was stated by Dr. Glenn to be equal to that of the finest grain photographic films. However, much of this resolution is lost when the method is used for image recording because of optical limitations.

Projection system

To reconstruct an image from a series of ripples naturally involves a special optical projection system. However, it is not as complicated as it might appear at first.

Fig. 3 shows schematically the optical arrangement for a conventional projection system. It has a plane light source, a condensing lens and a projection lens. The light source is imaged on the projection lens by the condensing lens, and the projection lens images the slide on the screen. Fig. 4 shows how

(*continued on page* 78)

DON'T BE HALF SURE

Are you confused by manufacturer's claims? Do you suffer from product ignorance? Does your film film best? Tom Martin says try this test system. Easy to use, it adds fact to your opinion. Don't be half sure—be positive.

Like many photographers, I am always intrigued by new products and the manufacturers' claims for these products. It is always interesting to shoot a roll of the latest ultra-fine grain, super high-speed film or use the latest gee whiz juice developer. However interesting these products are to use, unless we can check results against a known product under similar conditions, our experiments will have little validity. The system which is offered here is one I devised to provide a basis for systematic testing of new products. It not only simplifies test methods but offers a permanent record of results for future comparisons.

Make up a supply of record forms (the repro department made mine for me) which contain spaces for the following, or similar, entries which are explained below.

We start with basic data: camera, lens, film used, exposure meter used, developer and nominal (or manufacturer's suggested) exposure index. I also include serial numbers of equipment and emulsion numbers. The serial numbers are useful should you want to repeat the test using exactly the same equipment or if you want to check one piece of equipment against another. The emulsion number provides a similar check for film used as emulsions vary.

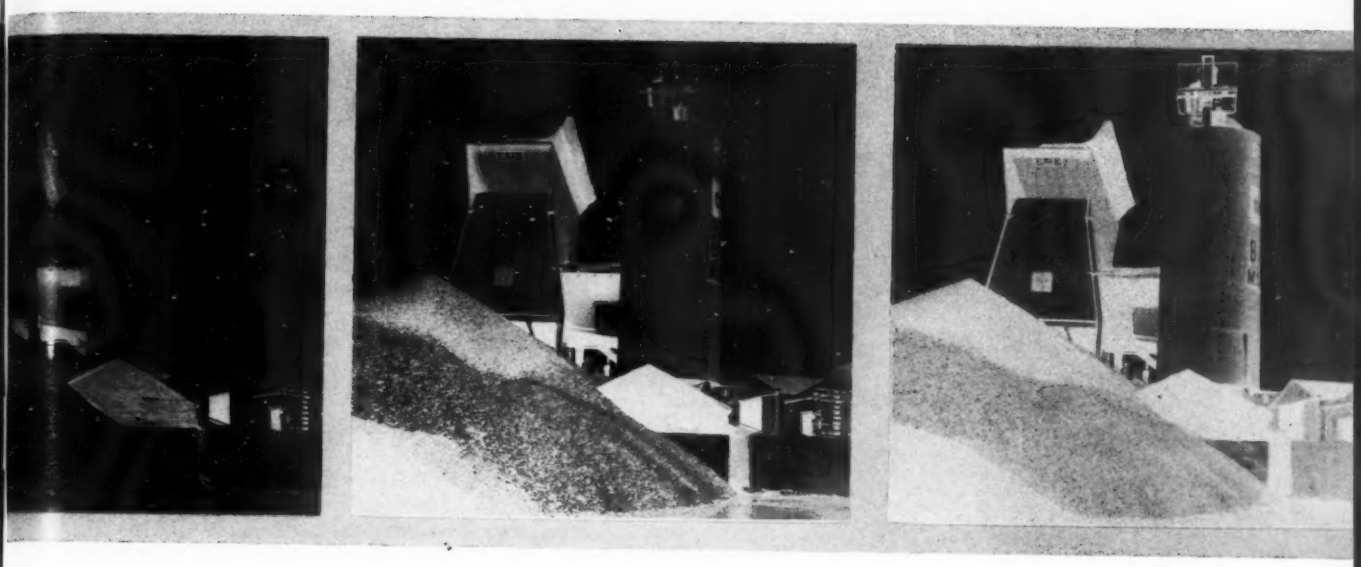
Secondly, we have the exposure record including scene brightness range, meter readings (low, high and average) and exposures used (apertures). Scene brightness is divided into three sections, low range, normal range and high range. These ranges include lighting ratios of 1:1 or 2:1 (low); 3:1 (normal) and 4:1 or 5:1 (high). When shooting, keep shutter speed constant and vary your aperture. Shoot at least four stops for each kind of scene. Try to use the same scene for each test. Pick a handy spot; my "normal" test scene is a group of houses with a full range of tones across the street from me.

The third section is the development record, with entries for time, temperature, dilution and agitation. Make two entries here, one for manufacturer's recommendations, the other for actual conditions. For example, recommended time for one film may be 7 min. while you used 8 min. This should be recorded.

Section four, "results", is a highly subjective standard but you will have to use your judgment in the light of your working procedures. Examine the strips of negatives as groups for each of the three brightness ranges to find the *best* negative. Remember; chances are more than likely that all negatives will be printable but you must pick the best of the group. Enlarge this "best" negative for maximum print quality. By converting the apertures to exposure indices, you will find the correct exposure index using your equipment and this film-developer combination on this type of subject. Generally, it is possible to use higher exposure indexes on low contrast subjects than on normal or high contrast subjects.

In addition to quantitative evaluation for best index, there are qualitative evaluations for sharpness, grain, contrast and latitude.

Sharpness is simply your judgment of how crisp the edges in the image look as compared with images from other film-developer combinations. Grain is checked by making controlled ratio enlargements on glossy paper. Try to compare textureless areas of like density as this will influence grain. A light grey area such as a cloud-



less sky or a smooth wall is ideal for comparing grain.

Contrast is another visual observation based upon the prints and what you think is best. For latitude, examine the negatives and find the number of negatives "under" and "over" the "best" negative which will produce reasonably good prints.

Notations for color response indicate the film's ability to record colors in equivalent greys. Fog and density range are designed for lads in labs with densitometers who can measure these qualities.

Finally, there is a space for conclusions which are strictly your own. This will record any data or information not included elsewhere as well as your impressions.

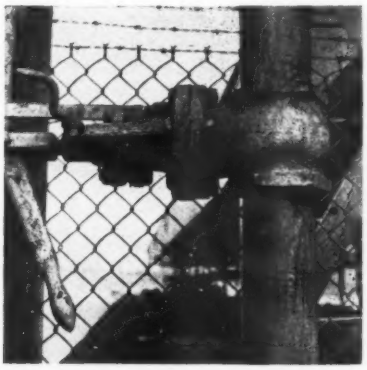
Remember, for valid testing, be consistent, be accurate and be methodical, whatever system you use. Of this trio, consistency is the most important factor in testing.

A suggestion is to pick out your test area and your standard film-developer combination and check this thoroughly until you know just about what it can and can't do. This provides the yardstick by which any other materials may be measured. Is "Whiz Pan" really faster than old reliable? Does this umpteenth miracle soup work? A roll run through your test system will give you a rough idea. While not absolutely scientific, this system provides a small grain of salt for checking claims of over-optimistic manufacturers.—THE END

Sharpness and grain can be compared in prints like this. While not exact, this method provides a fair degree of objective comparison between the different films being tested.

High-speed film exhibits coarser grain structure, less sharpness in this 20X enlargement. Compare this picture with print on left from fine grain film. Handy target aids consistency.

High contrast subject requires lowest exposure index to place both the highest and the lowest densities along the straight-line portion of film curve.



Low contrast subject has less extreme brightness range, permits use of higher index. Pictures like these test film's ability to separate detail.

SOME COMMENTS ON STATIC

David B. Eisendrath, Jr., continues his review of facts about the nature, dangers and remedies of static charges on film and apparatus

In my last column I discussed the problem of static in general and such anomalies as "Hot Charlies," persons who are particularly efficient at generating static.

Before getting into the actual handling of specific static problems, in photography I might well mention that there are several commercially available instruments on the market that are used to detect the presence of static. They can tell you whether a piece of equipment holds a static charge, whether certain action such as film or photographer movement is creating static, and when anti-static measures are effective. Some of the simpler and not too expensive detectors are: Electronic Electrometer (Central Scientific, New York, N. Y.), Keithley Electrometer, Keithley Instruments, Cleveland, Ohio), Electrostatic Locator (Simco Co., Lansdale, Pa.) and Electrostatic Voltmeter (Sensitive Research Corp., New Rochelle, N. Y.). There are several kinds of instruments made, some battery operated, some 110-V AC. Whether it is worth purchasing such an instrument or not depends very much on how big a problem you have, how big your operation is, and how expensive a nuisance static is to you. Bill Sumits of *Life* called my attention to a do-it-yourself static detector which is described in the April 1957 issue of *Popular Electronics*. It works very well and Bill uses it for running down conditions or people that may be causing static problems.

I must add a note on static detectors, however, to say that an expert static engineer who runs down gremlins for industry told me with a twinkle in his eye that all the fancy instruments were very good and had their place, but a simple, reliable and inexpensive detector could easily be made by hanging 15 in. or so of thin dry thread near a suspected object or subject and seeing whether the thread was attracted, repelled, or hung straight. It works, too. Sometimes when treating hard-rubber dark-slides I use the thread test which quickly tells whether the treatment is effective; be sure there's no draft blowing, of course.

Static in electronic flash

Let's look at some specific problems of static and some methods of handling them. In my introduction last month I pointed out that there were four general areas in which static plagued photographers, the first being the effect on electrical and electronic equipment.

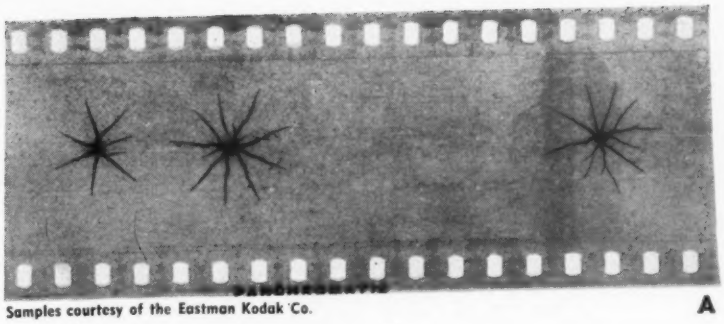
Some electronic flash units, although well-designed and built, have very sensitive triggering circuits. This is an advantage in that they fire with very little current, they normally don't arc offensively on shutter contacts, they are triggered very easily and reliably with photocells, they are simple and positive in their firing. *But* some units, especially highly sensitive ones, can be fired or triggered by accident, or become self-triggering because of static. This is particularly true when they are used in a warm dry atmosphere and in a studio or on location where there are thick carpets on the floor. Static charges build up and the units fire at the wrong time. Grounding the units to a water pipe or radiator is usually very effective here. Also, some studio shutters have contacts that are not grounded properly and a photographer touching some part of the camera may cause a static spark to trigger the electronic flash unit. Certain portable units, especially those with plastic cases or covers, have also given a good deal of trouble with premature firing. These are especially annoying for they may prefire readily when worn or carried by one person and rarely misbehave when carried by someone else. Here you have a case of a "hot" operator again, someone who is making more than a normal amount of static.

For the self-triggering portable where the triggering is caused by static and not an electronic malfunction or shorting, most effective remedy is to coat the plastic case with an anti-static solution. There are many good anti-static materials on the market, but a word of warning, please. Many of them contain substances that are *bad* for film, and such a material, if on a piece of photographic equipment, can easily be carried by the hands to raw film and may cause a fogging effect, or, in the case of some silicones or additives, may also cause improper developing. For wiping on electronic flash cases, I have used Optastat (a paste from Optics Mfg Co, Philadelphia, Pa.), Anti-stat 6 Solution (aerosol spray by Braun Labs, Philadelphia, Pa.), Eastman Kodak's Anti-static Solution 23791 (available on special order), Nutran-S (Henry P. Korn; New York, N. Y.), Ecco 1341, Ecco 1500, Ecco 121 (all by Electro Chemical Corp, Montclair, N. J.). If you have access to textile treating materials, you can also use Du Pont's Zelac (slightly photo-active,

wash hands well), Rohm and Haas' Tamol N, or American Cyanamid's Cationic S.P. All of these materials leave a slight residue on a plastic case and help to dissipate charges. They should be wiped on gently (rubbing makes static!) with a soft cotton or flannel cloth and then wiped off so there's no visible residue. Be sure to wipe the plastic shoulder straps, too, for the strap rubbing against a wool jacket or sweater is a fine static maker.

Zirconium flashbulbs

Another headache these days is static prematurely firing flashbulbs. I say these days for a purpose. Years ago when bulbs were first made, they were very sensitive to static, electric current, radar and heat. Manufacturers tried hard to make them less sensitive to these hazards so they would be safer to use and handle—and for years flashbulbs were well protected. So much so, in fact that it was sometimes hard, if not impossible, to fire bulbs deliberately by placing them in contact with each other. Recently the bulb manufacturers discovered that zirconium, produced in quantity for the demands of the Atomic Energy Commission, was an ideal material for flashbulbs, for it burns more than twice as brightly as aluminum, creates more light with less pressure, and burns cleaner. But, alas, the zirconium bulbs are also much more sensitive to accidental firing by static. Although the manufacturers may tell you how you can put a couple of dozen of the new small lamps in your pocket loose—*don't*. Especially if you happen to be a "hot Charlie." Too many of my friends have nursed burned hands and hips from bulbs that have gone off in their pockets from the static generated by body movements. Burned their clothes, too. I am hoping that the bulb manufacturers will come up with an answer to this one soon themselves. For the time being they are using a silicone lubricant to keep static down (and to make the mini-bulbs slide through automatic guns better). Silicones help to keep the static down (less friction) but a too heavy application will come off on your hands and may be hard to wash off. If it gets on film, it may keep developer from reaching the emulsion evenly, so be sure your hands are well washed after handling the very small flashbulbs. Best advice on carrying small zirconium bulbs is



Samples courtesy of the Eastman Kodak Co.

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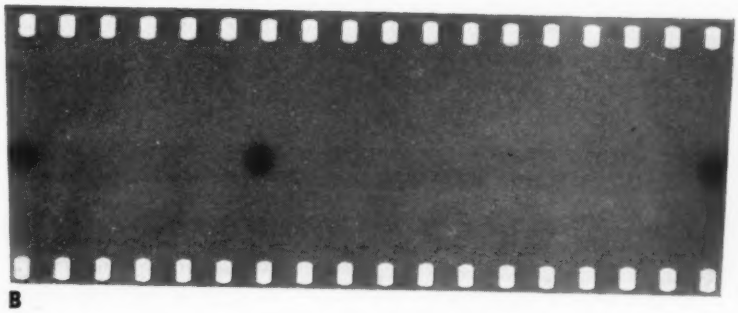

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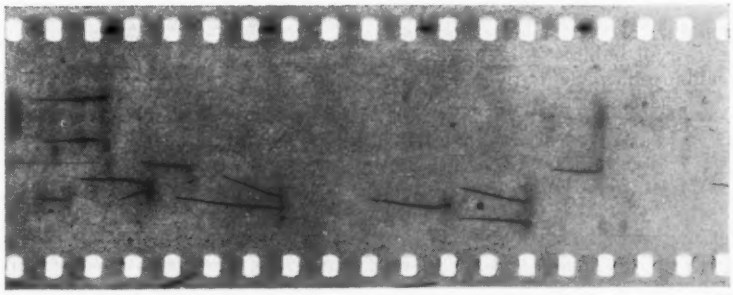

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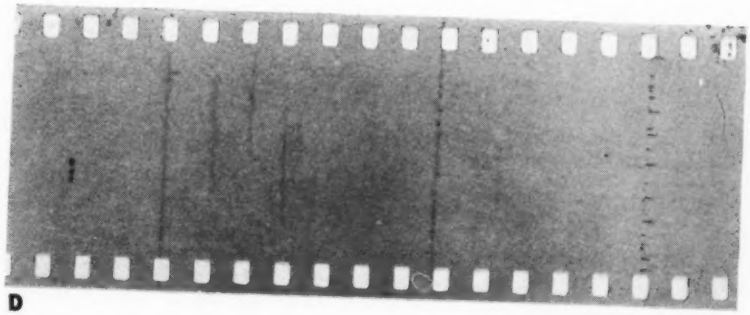
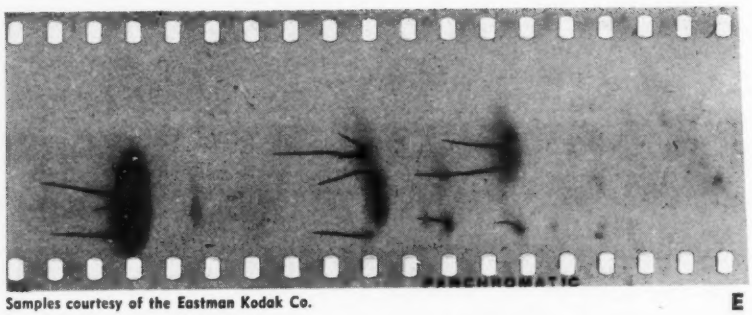


D

A Excellent example of branching static caused when film is charged negatively and charge jumps to nearby object. **B** Example of static mark caused by positively charged film where spark has jumped *from* small nearby object. **C** Static marks made by sparks jumping to roller in motion picture camera or winder when film has negative charge. Dark dots at ends of streaks show where contact was made. **D** Markings on motion picture negative made when film has positive charge and discharge has come *from* roller.



Samples courtesy of the Eastman Kodak Co.

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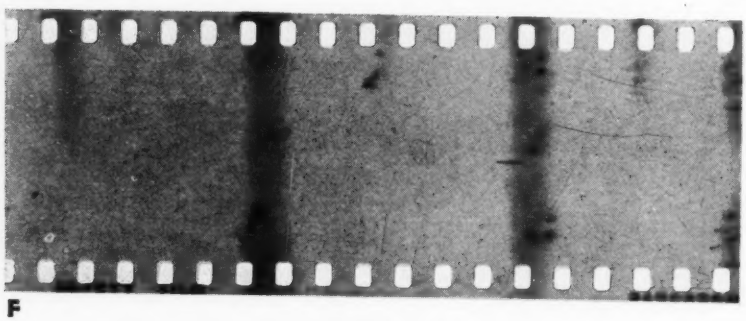

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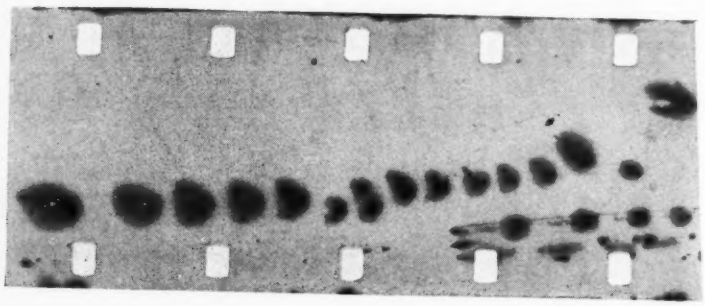

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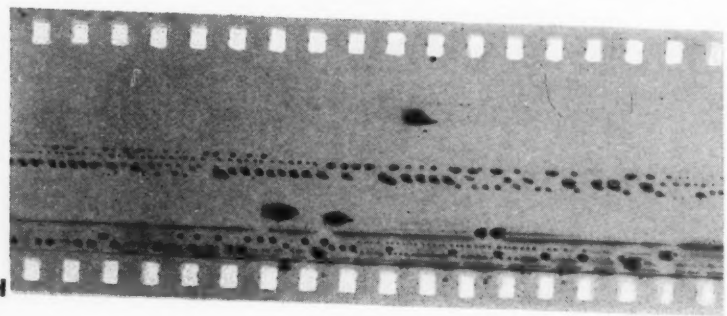


H

E Violent discharge marks caused by rapid unwinding of roll of motion picture stock. Here the part being unwound has negative charge and static has jumped to supply roll. **F** "Bar static" in motion picture film typical of pattern made when tight roll is unwound rapidly. Tension in winding in manufacture, in spooling or in camera may cause this kind of pattern. **G** and **H** Examples of "bead" or "pearl necklace" static marks in 16mm and 35mm film caused by generation of static by operator rubbing hands over film.

don't carry them loose. If you must, you might try spraying them with one of the anti-stat sprays like the Braun Anti-stat 6 mentioned before or Simco's Neutra-Stat or Walco Stati-Clean (the latter made for treating vinylite phonograph records). Be sure, though, that any residue is washed off your hands before loading or unloading film. It would probably be good to ground a pocket or bag where loose bulbs are carried but it's safest just to leave them in their sleeves until ready to use.

Darkroom and equipment

Another major area where static causes problems is in those cases where static on driers, trimmers, vacuum frame glasses, printer and enlarger glasses, causes contact screens, X-ray screens, prints, data cards, aperture cards, etc., to stick together and makes for difficult handling. Cleaning the mechanical objects with the aforementioned anti-stat solutions may do well to help dissipate static charges and keep them from building up so rapidly. Grounding all equipment is also helpful but you must be sure that parts are not insulated from the ground connection by coats of paint, lubricant, fiber bearings or washers, or just plain dirt. The tinsel ribbons used on printing presses (and Christmas trees) do well to pick up charges from material that brushes past, but only if they are well grounded and not covered with an insulating coat of dirt or grime. There are some special cloths made for wiping glasses, screens, etc. Some that work well for cleaning equipment are the Faber Anti-Stat Cloth (Haber and Fink, New York, N. Y. imports these); the Jockey Cloth (Robins Industries, New York, N. Y.) Nutran Selwyt Cloth (Henry P. Korn, New York, N. Y.) Walco Dis-Cloth (Walco Products, E. Orange, N. J.) that work well for cleaning equipment. The Faber Cloth is safe for negatives, too, and is especially good. It is used at *Life*, Modernage Photo Service, and other professional service labs for cleaning not only negatives but condensers, printer glasses, negative carriers, etc. Care should be taken about using cloths containing silicones on surfaces that are used with undeveloped photographic materials, for *some* silicones affect photosensitive emulsions, and may also repel water or developer.

Electro Chemical Products Corp. specializes in anti-stat materials for the photographic trade, which is why their name keeps cropping up. Long time manufacturers of destaticizing material for motion picture films, they even make special applicators for treating cine material. The folks at Eastman Kodak, Du Pont, and Ansco keep warning me about using some of the anti-stats designed for the printing and textile industries which work fine there but cause harmful results to photo materials. There is a new rather unique anti-static material called Ecco 121 which is in a wetting agent and is used in water as a rinse for films and prints or can be used diluted for wiping or cleaning other materials, too. Most anti-staticizers are in an alcohol, methyl chloroform, methyl chlorophene, or similar carrier. The water solution does not clean away grease as well as the other solvents but does make a clean-drying non-streaking anti-static surface. Used on prints, it helps to keep them from sticking together or to a drier.

Best solution for prints sticking to driers is to place a gentle aura of ionized air across the drier drum just at the point where the print begins to come part way off the drum. Such a unit as the Kodak Anti-Static Eliminator Power Unit and 18-in. Inductor is excellent. On a roll paper cutter or glossy print drier, these units will neutralize materials passing over (or under) the inductor. Some installations also use a small blower to blow a stream of ionized air against the print; this helps to physically remove them from the glossy drier and also neutralizes any charge so prints don't stick together. Similar equipment is used on IBM cards, Filmsort aperture cards, etc.

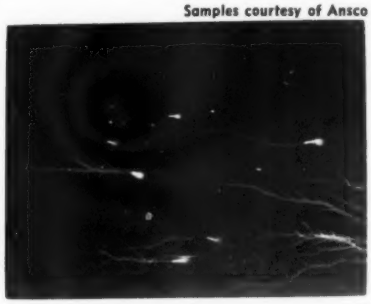
Principle behind all of this is to provide some sort of grounding path for the charge to run off through.

Static on films

Now we begin to get to the place where static is no longer just an annoying nuisance, making strobes flash prematurely or things stick to each other. The area where it affects films, both negative and positive and other sensitive material as well.

The static that affects films both before and after development and causes dust and dirt to stick tight is very annoying. Dust is also attracted to negative carriers, slide covers, lens surfaces, condensers, camera interiors and almost any place where there is a smooth, clean surface where friction or close adhesion can cause static. Many of the materials mentioned earlier can be used with good results on slide mounts, condensers, printing frame and enlarger glasses, contact screens, and so on, but extreme care must be used in choosing suitable anti-static materials for use on film itself. If the film is to be used in actual contact with other film (motion picture negative, for example) particular attention must be paid lest materials be used which might be transferred to the raw stock and affect the photographic sensitivity or developing characteristics of the emulsion.

Samples courtesy of Ansco



Lightning or forked markings (above) caused by negatively charged film. Intense spots show point where charge left to jump to nearby object. Marks of feather, dot and streak type (below) caused by hands moving over film in close contact.

The Ecco 121 wetting agent mentioned earlier is not only a good rapid acting wetting agent used as a final bath in processing or as a rinse for anti-staticizing, but leaves films so they can easily be cleaned with an anti-stat film cleaner or a device like the Faber Anti-Static Cloth or the Kodak Anti-Static Eliminator. There is a great difference between atmospheric dust which settles on a film and can easily be blown or wiped off, and dust which is attracted by a surface with an electrostatic charge. The latter clings tight and rubbing only seems to build up more charge to attract more dust. Cleaning with the materials mentioned above leaves the film neutral with no attracting charge.

One of the great dust-static makers is the hard-rubber slide used in sheet film or plate holders. The best material from point of light safety is hard rubber. It has somewhat higher electrostatic characteristics than other materials, however, and the very act of pulling and inserting it in a holder tends to build up static charges which attract dust or eventually make a visible spark. Many of the materials I've been mentioning are very good for treating slides. Eastman Kodak's Anti-static Solution 23791 is prepared especially for the treatment of darkslides. The Optastat material (Optics Mfg Co., Philadelphia, Pa.) is also excellent for this purpose. In treating slides, be sure to get a coating on both sides of the slide, and try to rub some of it off on the felt light trap of the holder. Some of the older holders come apart so the material can be applied directly to the trap, but newer holders are riveted and I find that an eye dropper with a very thin plastic tube can be used to put a very light treatment of anti-stat material directly to the holder light trap. This will keep treating the slides as they are pulled out, reversed and inserted. One application will last for several months.

Negative treatment

Probably one of the best ways to clean and anti-stat negatives before contacting or enlarging is with the Eastman Kodak Dust and Static Eliminating outfit. This unit, which comes in several sizes, makes a corona of electricity at 3500 V AC. The ionizing area is placed behind a brush and ionizes the air around it, the air then acting as a conductor to bleed static charges from the surface as the brush removes dust. There are units with pairs of 10-in. brushes through which negatives or transparencies are pulled, coming out clean of dust and with no charge to attract more. There are also smaller brushes and blowers so that a stream or jet of ionized air can be used for cleaning and removing static charges at the same time.

(*continued on page* 60)

MEMO ON:

HIRING

We don't want a genius; the ability to get along with people is as important as photographic talent

Can he meet anyone in the company, from president down, be friendly, yet firm enough to get his picture

Spare us loudmouths, slouchers, beatniks, portfolio carriers and know-it-alls

Is he neat, with short hair, white shirt and shined shoes? Does he create a good impression?

"Geniuses not wanted" is the motto of American industry when it comes to hiring photographers and photo technicians. The excitable, egotistical prima donna of the fashion or journalistic world is not acceptable to either the photo departments or the personnel people. In short, the "organization man" has invaded the studio.

The ideal photographer, based upon talks with various photo department managers, is a highly skilled person who is basically able to get along with other people. Above all, he has the ability to realize that his work serves a purpose, that the picture is not the end in itself but merely a service paid for by the company.

The balance between ability and personality varies with the firm and the job but it is perhaps the most important factor in getting and keeping a photo job.

For photographers, personality is very important. As the head of one large company put it, "one of our photographers has to be able to meet practically everyone in the company, from a janitor's helper to the president. He must be able to get his picture and at the same time remain courteous, friendly and, in the case of top brass, respectful. The 'push 'em around' methods of a newspaper photographer just won't go here." (This manager spent almost twenty years as a cameraman for a large press association, so that he speaks from experience.)

Even when public relations is not a factor, personality is important. The head of a section in a large research facility where many of their public are cadavers reported that "when we consider a new man, we take him around to meet the people here in the section. While the final decision is mine, I would not hire someone that everyone disliked. It is important in a small place to have a harmonious, smoothly-running section."

But even after separating the genius from the wheat, the problem of separating the wheat from the chaff still remained. Here, the preferences were less clear.

Appearance was the clue which was used by all managers as an immediate criterion. All things being equal, white shirts, short hair and shined shoes are highly favorable indicators. Here too, criteria vary with the job.

"A photographer's appearance is very important in this company," reported a supervisor for a large firm. "We like a certain type of person who can create a favorable impression wherever he goes. In the case of darkroom people, the standards are not nearly so high; all the technician ever sees is people in the section so his public manner is not as important as his photographic ability."

Just a matter of manner

Another clue looked for in the preliminary interview is manner. "If an applicant walks in as if he owned the place, it creates an unfavorable impression in my mind," said another photo department manager. "In fact, if he is a little shy and nervous, I like it. To me, it indicates that he is not a know-it-all, but is, perhaps, a little afraid. In a new situation, this seems to be more normal."

Another section manager disliked "slouchers who almost slide out of the seat. I don't want anyone who makes himself too much at home."

The importance of personality evaluation is that it swings the decision when experience or training are not outstanding. Many of the job openings are in the lower grades where a minimum, or just slightly more, experience is required. In situations like these, the personal reaction of the photo section head determines who gets the job. In none of the sections queried did the personnel department do more than either a preliminary screening or routine processing of selected applicants. The hiring decision was made in the section, either by the manager alone or in conjunction with his supervisors.

All of them agreed that the best method of finding a person's ability would be to give him a piece of work to do; tell a photographer applicant to shoot a roll of film, for example. Time does not permit this and all interviewers feel that a fairly long talk will determine the person's actual knowledge. "If, for example, a man comes in as a 35mm specialist and he says he develops all his miniature film in Dektol, something is wrong." Rough as it may be, this system works.

Schools of photography evoked mixed reactions. At one photo section, potential photographers were transferred from non-photo jobs (if they showed an interest or experience in photography) and often sent to photo schools at company expense. In another section, a personal recommendation from one of the instructors at a well-known photo school carried weight. The manager explained that "we have had good men from him before and I don't think he would jeopardize his reputation by recommending unqualified applicants."

In the larger companies, however, photo schools were thought of as providing a good basic training but not much more. Several section supervisors reported that they preferred an amateur with several years of hobby experience to a photo school graduate. Another felt that photo schools were fine for special techniques which could not be learned any other way, such as portrait lighting, color printing, retouching, etc., but that the basic courses were without much value.

Here too, however, the level of the opening created its own standards. Often, a well-qualified experienced photographer is needed in a hurry and the quality of his experience is more important than training. This standard varies too. In one company, a darkroom man was hired from a commercial house because he could produce prints in a hurry over applicants who were, perhaps, better printers but whose backgrounds indicated a painstaking, time-consuming approach.

Portfolios—keep them home

This element is the biggest single factor in the nearly unanimous rejection of portfolios. "Sure some of the pictures shown are excellent, but how do I know how many pictures he took to get these or how long it took to print them?" One manager raised the possibility that the portfolio was not made by the applicant.

Getting a job in photography, especially for newcomers without paid experience, is still pretty much a matter of taking any job, no matter how low paid, and going from there. Only a few openings for apprentices were reported in plant photo sections, primarily because the small size and large work load of most departments makes immediate production essential.

Once some experience is gained, jobs are not too hard to find, according to several of the photo section managers. All admitted, however, that their vacancies were few and far between. But all revealed that expansion plans are creating new job openings and that when they do have an opening, a good man is hard to find.—THE END

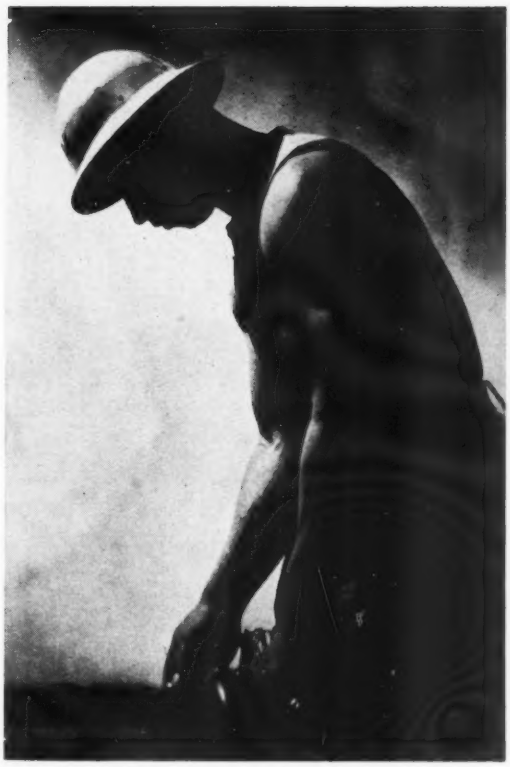
Jackhammers powered by compressed air pound man and bedrock unmercifully in a battle no construction man ever evades. Holes strategically drilled under the direction of a blaster will house sticks of dynamite to make clean breaks with the rock's grain. Anonymity of workers and abstract quality of the picture add impact to Mottar's statement. To handle the low light levels which prevailed he used a Nikon SP loaded with Kodak's Tri-X film.

PORTFOLIO NO. 20

When Robert Mottar, New York free-lance photographer, was commissioned to record the birth and growth of Chase Manhattan's new headquarters in downtown Manhattan, he came as no stranger to construction sites—having seen and shot rising steel and bridge building before.

Most of the photographs shown on these pages are part of a series taken during the early stages of the building's excavation. *Fortune* published a similar portfolio in the February 1958 edition and entitled it "The War with Bedrock". So many of Mottar's pictures eloquently depicted man and machine in this "battle" that PMI has chosen to publish this portfolio as well.

The pictures on this page of typical construction workers—laborer with jackhammer *(right)*; ironworker perennially looking up (*below*); and engineer's rodman disinterestedly holding ruler—come off as much more than the prosaic snapshots that so often appear in the typical building progress report.



Steel mats *(right)* are grappled into position to hold down flying debris during dynamite blasts. Less spectacular, but much safer than the old fashioned approach of loading up the charge-holes to the hilt and showering the countryside with dust, smoke and flying rubble when the charge goes off.

A hardhat seldom comes off except to wipe a sweat-drenched brow or for brief moments during a smoke break *(left)*. Massive bucket of power shovel *(below)* will soon move into action to scoop away the loosened rock as layer after layer is blown loose by nitro. Although all of these shows were made with the Nikon loaded with Tri-X Pan or Super Hypan film, Mottar also used a Rolleiflex while dodging the crew and machines. He even used a large camera when a deliberate set-up shot warranted it.

Every field has its expert's expert, the type of person who can deliver a job that seems always a little better than anyone else's best. In photography these are the printers at custom labs. Their product: quality.

Their attitude is that anything less than the best is unacceptable and that even the best can be improved. To get this best, they resort to every trick; in the words of Ralph Baum of Modernage, "There is no such thing as a straight print in this business."

There are about two dozen custom labs, servicing photographers who want quality and are willing to pay for it, from $1 to $1.35 for an 8 x 10 print.

Their services include developing, mounting, copying, retouching and maintaining negative files for their customers. Equally important are the services which never show up on a price list: giving advice, listening to alibis, telephone service to all continents and serving as a refuge when the demands of the outside (non-photographic) world get too much to take.

Manya Sweet

Manya Sweet began as an assistant to her brother, Dmitri Kessel of *Life*. A gracious lady, her relationship with her clients is as much personal as professional. She once advised a young girl photographer who had trouble setting her price to let her customers make the first offer. The result was that the girl collected $150 per picture instead of the $25 which she had intended with misgivings, to ask for.

Assisting her is Andy Torino, a former Navy photographer who came to her as an apprentice in 1946. Together, they do all the developing and printing for a list of customers which reads like a photographic Burke's Peerage.

Manya Sweet: You have to listen to photographer's tales of woe.

The Sweet lab is small, simple and spotless. Most of the work is done on an Omega D2 whose lenses include a 50mm Raptar, a 75mm Ektar and an Eastman Projection Anastigmat for 4 x 5. The standard paper is Medalist, carried in 8 x 10 and 11 x 14 sizes only. This paper is developed in Dektol, about 1:1½, with a slight amount of bromide added.

Although they follow photographer's instructions, they share the printer's common complaint that many photographers fail to read their exposure meter correctly and the general level of craftsmanship is low. Miss Sweet blames the current trend toward 35mm work and available light for this, adding that the photographer's lack of technique places even more responsibility on the printer for good photographs

Axel Grosser

Axel Grosser, formerly with Modernage, is the newest of the labs, having opened only six months ago. He is determined to stay small enough to concentrate on quality without compromise. Also, he is determined not to become an executive. "My work is in the darkroom, printing."

His lab is, as Grosser puts it, "a two-and-a-half man operation, with myself, Patricia Motar, a very talented printer who worked with me at Modernage, and my wife who helps sometimes when she can." He feels that "the printer should have a certain spark so that when he makes a print, the photographer can say 'this is what I had in mind when I took the picture'. I had this the first time when Fritz Henle saw my work. Without this spark, the best a printer can be is competent. Maybe one per cent of the printers will be more than skilled technicians.

Unlike most other labs, Grosser uses variable contrast paper, Kodak's Polycontrast. A Simmons Variable Contrast Timer controls the printing times with the required filters. Special techniques such as ferricyanide, warm developers, etc. are kept to a minimum. Like all the "printer's printers", Grosser makes full use of dodging and burning in.

Axel Grosser: A good printer must possess a spark, a feeling for prints.

PRINTER'S

Bernard Hoffman

Bernard Hoffman, former *Life* photographer, opened his lab in 1951 to provide personalized, large scale, yet high quality finishing. Each photographer's jobs are printed by only one printer who gets to know just what the photographer wants.

Reuben Marrero: Even in a good print there is room for improvement.

There is also a unique quality control system. The printer in the darkroom passes a print from the hypo through a window in the wall to the print finishing room. There, Hoffman, Mrs. Hoffman or Ruben Marrero, the print finisher, check the print. If it is not up to standard, suggestions are made to the printer on how the print could be done over. If it is of suitable quality, it is processed in the usual way.

By examining a print lighted from the back, hidden shadow detail can be detected. This can be brought out with ferricyanide which is used on virtually all prints at Hoffman.

The lab is equipped with Densichrons but the use of them is optional. Sol Blackman, dean of the darkroom at Hoffman, does not use one, while Harold Berting who specializes in big enlargements, 20 x 24 and up, swears by his. As in most labs, printers are allowed to use their own methods as long as quality remains high.

Very often, a new customer will work with the printer assigned to him until both know exactly what type of prints are wanted. Sol Blackman, for example, prints the work of 30 customers, no two of whom want the same type of print. Prints made for newspaper reproduction are printed ½ grade harder than for exhibit or magazine work. Most important, from the quality standpoint, is that Hoffman is willing to spend the time necessary to get a good print, even if he must turn away new customers to serve old ones.

Compo

Compo offers one service which is unique, at least as far as New York labs are concerned. They specialize in exhibition prints, up to 72 in. (they prefer not to call these prints murals because they are not attached permanently to a wall). Among the shows for which Compo has made prints were *The Family of Man* and *The Artist in His Studio*, at the Museum of Modern Art.

The prints are made by Larry Matthews. With Compo six years, he has had 20 years experience in photography and describes himself as "a professional amateur."

He uses an Omega D2, placed horizontally on a platform mounted on rails. The pictures are projected on the wall on Kodabromide rolls

Dick Schuler: Camera carelessness means more work for the printer.

and developed in Pictone 1:1 for 1½ to 3 min. Matthews reports no special problems with this work except for the limited depth of focus which makes critical focusing essential. Often, he focuses by slightly unscrewing the lens from its mount,

Larry Matthews: If you have a good negative, large prints are easy.

rather than moving the lens board of the enlarger. The normal focusing knob is too coarse for the extremely limited tolerance. Exposures run from 15 to 20 min. due to the extreme magnification (many prints are from 35mm negatives) and the small stops (for maximum depth of focus).

At Compo, ferricyanide is used for about half the prints, Schuler feeling that if properly done, it will not be noticeable. If it is, he orders the print remade. All prints are treated in hypo neutralizer and, before drying, in Pakosol. This not only helps drying, but prevents prints from becoming brittle.

Modernage

Ralph Baum started Modernage in 1944 and expanded it to its present position as one of the largest custom finishers with two branches; at 480 Lexington Avenue for the deluxe trade and at East 44th Street for larger orders. Twelve printers, all experts, staff the darkrooms.

In addition to being experts, they are all individualists, using whichever materials they prefer to reach the desired level of quality. Among the papers used at Modernage are Ilford's Multigrade, Kodak's Kodabromide and Medalist. Many of the printers prefer graded papers, rather than variable contrast, feeling that the blacks are somewhat purer.

With the exception of an 8 x 10 Saltzman used for enlarged contacts,

(*continued on page* 91)

SPRINTER

ENLARGING METERS

MODEL	AREA READ ON EASEL	FT. CANDLE RANGE & ACCURACY	CALIBRATION SYSTEM	NOTES
AGFA INC., 516-20 W. 34th St., New York 1, N. Y.				
Agfa Variomat C $750.00	5x7-in. easel	Not available at press time	Operator calibrates unit using typical negative. ± 20, 40 or 60 per cent density settings available.	Unit is an easel (5 x 7 in.) which measures light passing through printing paper and determines exposure time. Recalibration is necessary for differing paper weights, emulsions. Unit is rubber sealed against humidity. Larger platform available permits use of unit for 8 x 10 and 11 x 14-in. prints. Variomat V is similar except is complete system with enlarger.
AMERICAN PHOTOGRAPHIC APPLIANCE CORP., Greenfield, Mass.				
APAC UHS Photo Eye Timer $396.00	⅞ in. approx.	Exposures range from 1/100 sec. to 2 min.	Five exposure control buttons, individually adjusted for various emulsion speeds.	Automatic exposure unit measures light reflected from easel. Unit may be used with automatic roll-paper easels. Scanning head flashes red spot on easel for proper location before exposure.
BURKE & JAMES, INC., 321 S. Wabash Ave., Chicago 4, Ill.				
Automator ASU-8P $199.50	Integrated light reading from easel	Not available	Guide numbers for emulsions once calibrated by operator.	Automatic exposure control unit turns off enlarging light. Operates on 110 or 220 V AC.
Automator ASU-7 $149.50	As above	As above	As above	Similar to ASU-8P listed above.
Automator ASU-8K $318.50	As above	As above	Must be calibrated for speed and grade by user.	Automatic exposure control with 5 x 7-in easel. Ejects paper after exposure.
Luxor Darkroom Exposure Meter $149.50	2-in. diameter	As above	Scale shows exposure time in sec. once unit is adjusted for emulsion speed.	Unit has adjustable dial light. Operates on 110 or 220 V AC.
ELECTRO-PHYSICS CO., 287-R Broadway, New York 7, N. Y.				
Printometer $380.00	1/16-in.	Reads 1-60 sec. exposures	Per cent transmission & exposure time.	Designed for making enlargements in color from positive color transparencies.
FOTOMATIC CORP., 2603 Kessler Blvd., Indianapolis 22, Ind.				
Elwood Photric-Timer 400 $127.00	½ x ⅜-in. min. 5 x 6-in. max.	1 sec. to 6 min. exposures ± ½ per cent repeatability.	Settings for two extra emulsions, once unit is adjusted by user.	Automatic exposure control unit. Scanning spot varies with height of adjustable head. Accessories available permit use with roll paper easels.
Photric-Timer 1200 $350.00	1/16-in. sq. min. 6-in. sq. max.	½ sec. to 8 min. exposures ± ½ per cent repeatability	As above but unit has 6 range switches for differing emulsions.	As above plus built-in voltage control to handle line variations ± 15 V.
LESTER C. HEHN ENGINEERING, 30 Manorhaven Blvd., Port Washington, N. Y.				
Printor Enlarging Meter $39.95	3/16 in. diameter	Repeatability to 1/20th of an f/stop	Neon indicator light set by user.	Photocell is sealed in glass from humidity.
Photo Design Color Enlarging Meter $135.00	As above	As above	Illuminated meter has numerical scale.	Unit is said to sensitive enough for color processes and black-and-white. Special probe adapters available for microscope use.
KARL HEITZ, INC., 480 Lexington Ave., New York 17, N. Y.				
Volomat Densitomer $39.00	Less than ½-in. diameter	Not available at press time	Goldberg wedge used to determine time and emulsion contrast.	Spot readings on highlight and shadow areas are matched visually with values on sliding Goldberg wedge.
IDEAX CORP., 150 Fifth Ave., New York 11, N. Y.				
Photo-Genie $15.95	.020 x .140-in.	.015 to over 2 ft. candle. Accuracy 5 per cent	Neon indicator light set by user.	Operates on line voltage of 95 to 130 V AC. Indicator light shows proper light level on easel.
KINNARD CO., 324 W. Vine St., Milwaukee 12, Wis.				
Spot-O-Matic $18.50	Variable area, ¼x½ to 1/16 x ¼ in.	.05 to 3 ft. candle. ± .01 density units accuracy	Paper grades and density units given. Time given for differing emulsions.	One piece unit operates on 100-130 V AC. RCA cadmium sulfite cell hermetically sealed. Unit requires 5-sec. delay when used for consistent results at stated accuracy.
LEKTRA LABORATORIES, INC., 154 Eleventh Ave., New York 11, N. Y.				
Densi-Timer PTM-4 $327.00	¾ x 1⅛ in. approx.	± 3 per cent repeatability. Sensitive for all papers	Coarse and fine settings for calibrating unit by operator.	Automatic timer and densitomer combination automatically regulates exposures. Reflected light is scanned during exposure. More sensitive and smaller spot pick-ups available.
Densi-Lux PTM-7 $270.00	1/16, 5/16 and 1/32-in. diameter apertures	1.0 to .001 ft. candle ± 2 per cent accuracy	Calibration scale shows exposure time in sec. from .8 sec to 120 sec.	Probe utilizes integrating sphere for light pick-up 90° to axis of light. Operates on 115 V AC. Has illuminated meter.

PMI's list of enlarging meters and automatic exposure control systems includes 28 units to help the darkroom man with his printing chores. Some were designed for color printing, or have some other primary use, but all included measure the light at, or just above, the enlarging easel.

MODEL	AREA READ ON EASEL	FT. CANDLE RANGE & ACCURACY	CALIBRATION SYSTEM	NOTES
LOGETRONICS INC., 500 East Monroe Ave., Alexandria, Va.				
Model B-5 and B-10 Enlarger	⅛-in. diameter aperture on 2 probes	.1 to 10 ft. candle range. 2 per cent accuracy over scale	Arbitrary linear units.	Complete enlarging system for 4 x 5 (B-5) and 8 x 10 (B-10) negatives employs two light sensitive probes for highlight and shadow areas. Unit has provision for contrast control and three ranges for different emulsions without recalibration by operator.
Model C-5 and C-10 $14,000 & $15,900	1/16-in. aperture on probe	As above	As above	Similar to above units but designed for Ektacolor printing from Ektacolor negatives.
MACBETH INSTRUMENT CORP., P.O. Box 950, Newburgh, N. Y.				
QuantaLog Analyzer EP-1000 $645.00	3, 5, 7 and 10mm apertures for probe	.01 microlumen at 2850K min. ± .02 density units accuracy; ± .01 density units repeatability	Three scales: linear calibrations show optical density, exposure time and color correction factor.	Primarily a color unit. Has two sets of attenuators each with four adjustments for indexing red, green, blue and exposure. Additional attenuators available as an accessory.
PHOTOCHRON RESEARCH INC., 2 Howard St., New York 13, N.Y.				
MP Photometer C $450.00	.010 to .24-in. apertures	1 millilumen low. ± ½ per cent repeatability	Linear scale shows per cent transmission, and optical density to 4.	Voltage regulators built-in handle ± 10 V line variation. Operates on 117 V AC. Photometer sensitive to color difference of .05K. Has plug-in probes.
Photochron Color Analyzer J $150.00	.010 to .24-in.	20 millilumens low, 40 ft. candles high. ± 1 per cent linearity and repeatability	Log scale shows exposure time and density.	Transistorized, battery powered unit, employs PN semi-conductor in probe instead of photo tube, connected to meter by 3 ft. cable.
PHOTOVOLT CORP., 95 Madison Ave., New York 16, N. Y.				
Spot Photometer 501-M $315.00	1-in. diameter	.01 to 10 ft. candle range	Linear scale shows per cent transmission, log scale density units to 2.0.	Unit has four-position range switch to permit total range of light values of 1:100,000.
Multiplier Photometer Series 520 $560.00	As above	.01 microlumen low	As above	Interchangeable probes with different spectral response available. Unit has four range switches for changing sensitivity of unit in decades.
Exposure Photometer 200-A $115.00	3.4-in. diameter	.05 ft. candle to 250 ft. candle	Meters ft. candles	Photocell is hermetically sealed in a plastic body. Has four range selector switch.
POLY INSTRUMENT CORP., 3921 E. 201 St., New York 58, N. Y.				
Lite-N-Time Integrator 501 $188.00	¼ x ½-in. min. to 2x3 in. max.	Said to give consistent exposures from 1-30 seconds. Supersensitive head to 45 sec. max.	Unit adjusted by user.	Automatic exposure control unit. Three scanning heads available. Mini-Beam scans min. spot 1/16 x ¼-in.
W. M. WELCH SCIENTIFIC CO., 1515 Sedgwick St., Chicago 10, Ill.				
Densichron I $250.00	7mm standard, others available, .046 and .125 in.	.01 microlumen low, max. sensitivity 10 microlumen. ± .02 per cent repeatability	Linear or log scale per cent transmission and optical density or optical density and time.	Unit is available with blue sensitive or red sensitive probes. Has range switch and volume control. Reads optical densities of 0 to 4.5 in black-and-white.
Densichron II $385.00	As above	.05 low, max. sensitivity 5 microlumen	Meter has three scales: optical density, time and color compensation density.	Panel of eight selector switches permits unit to be used as a single direct-reading instrument for each of seven characteristics.
Densichron 10	As above	.001 low, max. sensitivity 1 microlumen	Same as Densichron I	Similar to Densichron I except has ten times the sensitivity.
Densichron 20	As above	.0005 low, 10 times as sensitive as Densichron II	Same as Densichron II	Ten times as sensitive as Densichron II.

CLOSE SHAVE

Not an ad for razor blades but a method used by Torkel Korling to make two or three pictures do the work of one to cover more area

One of the characteristics of top professionals is the ability to come up with new answers to old problems. A typical answer is that developed by Torkel Korling, Chicago free-lance, to the riddle of the non-stretchable negative.

Every photographer has come up against the problem of space, or the lack of it, when there is just no way to back up to cover the necessary area in a picture. Or sometimes it is a problem of extreme depth of field, more than a lens can handle.

In cases like these, Korling, using a view camera, checks his ground glass for a convenient line of separation, then makes two or more pictures. The negatives or prints are cut along this line and cemented together to make one photograph which covers the required area. Differences in density are compensated for in printing and an airbrush or retouching will cover up the tell-tale marks. (For purposes of this article, the lines were not retouched.)

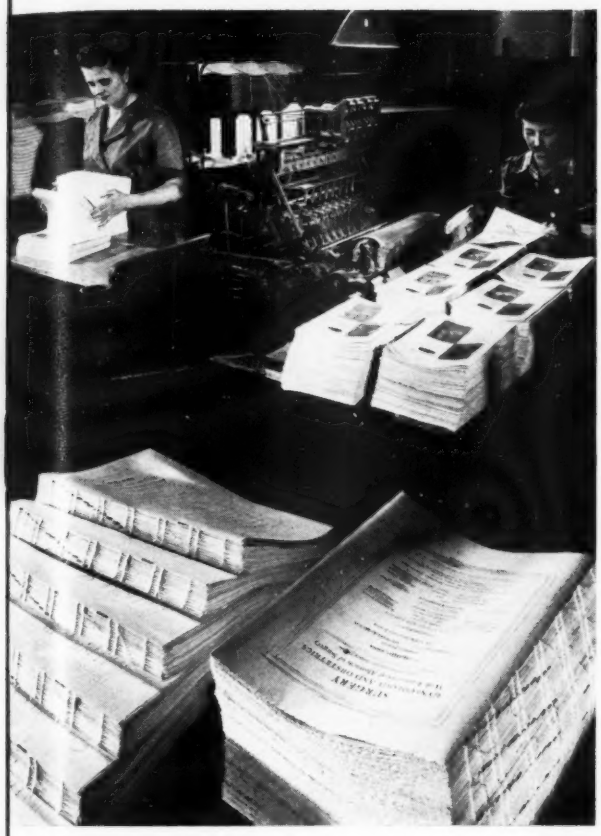
Two factors which must be considered in using this technique are lighting and perspective. Both must be consistent in the two pictures to maintain the illusion of one picture.

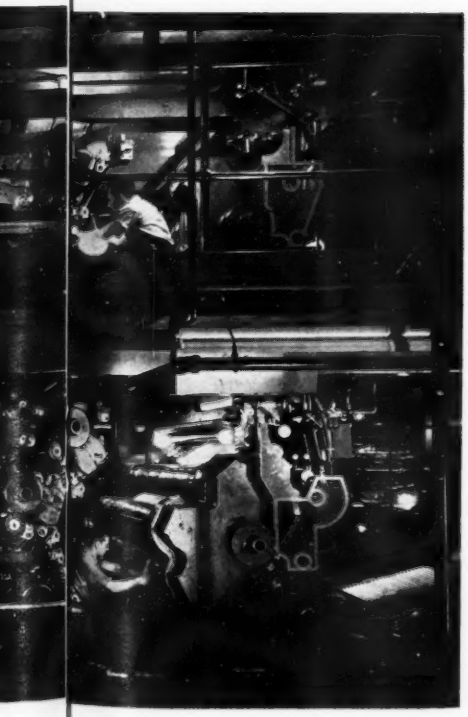
For interior picture, Korling uses floods and spots to boost light levels, yet keeps the atmosphere of the normal plant lighting.

Perspective is studied carefully on the ground glass before any pictures are made. The eye will accept a certain amount of inconsistency but there should be a close match. Basically, the problem is "a matter of practice and experience. You just have to study your ground glass for lighting and scene balance before doing anything."

Although vertical edges (a post, a pipe, a door jamb) are most convenient as a line of demarcation, a virtually black shadow can also serve. Very often, this is the only way in which horizontals can be joined. Here too, each picture is a new problem.

If, in making pictures, there is not enough light for the complete picture, illuminate one area at a time. But Korling emphasizes that there are no rules. This method can be used for either negative or prints. The picture of the presses was made from three prints taped together. The other pictures were made from spliced negatives.



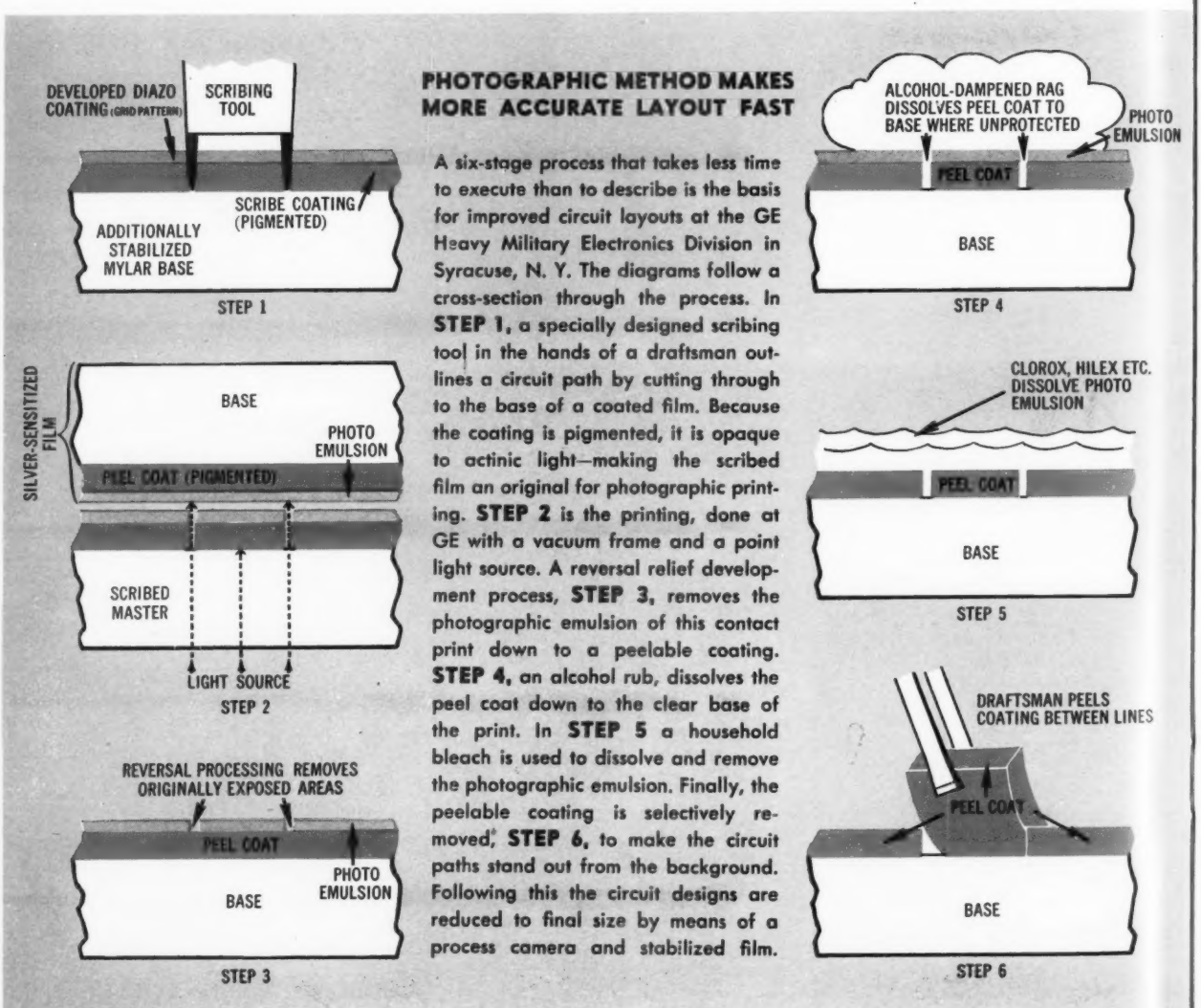


Depth of field is achieved by using the two-negative method, then combining the pair for one picture. In the photograph at the book bindery, one picture was made, focused upon the stitched volumes in the foreground. A second picture was of the girls at the machine. A close look will reveal the line running through the dark area across the center of the picture. A similar situation was handled the same way in the picture of the machine shop *(upper right)* where even the widest of wide-angle lenses was not enough to keep both planes in focus. The vertical door jamb served to join the two photos in the hospital picture.

Wide-angle coverage of the printing plant was made using a view camera and three prints, one on each side of the post showing the presses and one of the post itself. The dividing lines can be seen clearly at the top of the picture where they show up against the darker areas. Korling made this picture at the R. R. Donnelly plant in Chicago, part of an extensive series covering every phase of their operations. In this picture, he estimates that he was about ten feet from the press, flat against a wall. The camera was placed in the center, then swung slightly from side to side for each photo. None of these pictures were retouched to hide lines.

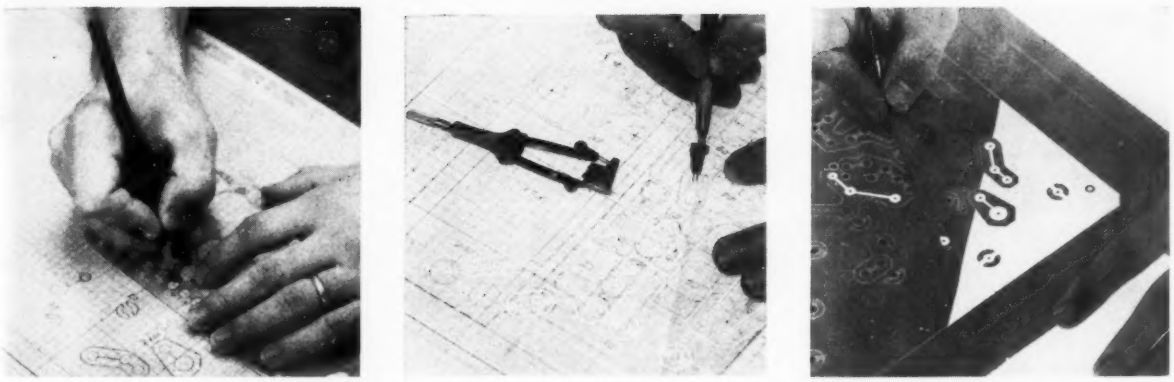
INNOVATION SPEEDS GE PRINTED CIRCUIT PLANS

A new technique for printed circuit layouts substitutes sharp steel, special coatings and a photographic process for pen, ink and drafting tape. A General Electric Co. division, the first to use it, estimates that it has already saved $27,000 on a project involving 300 precision printed circuits



PHOTOGRAPHIC METHOD MAKES MORE ACCURATE LAYOUT FAST

A six-stage process that takes less time to execute than to describe is the basis for improved circuit layouts at the GE Heavy Military Electronics Division in Syracuse, N. Y. The diagrams follow a cross-section through the process. In **STEP 1,** a specially designed scribing tool in the hands of a draftsman outlines a circuit path by cutting through to the base of a coated film. Because the coating is pigmented, it is opaque to actinic light—making the scribed film an original for photographic printing. **STEP 2** is the printing, done at GE with a vacuum frame and a point light source. A reversal relief development process, **STEP 3,** removes the photographic emulsion of this contact print down to a peelable coating. **STEP 4,** an alcohol rub, dissolves the peel coat down to the clear base of the print. In **STEP 5** a household bleach is used to dissolve and remove the photographic emulsion. Finally, the peelable coating is selectively removed, **STEP 6,** to make the circuit paths stand out from the background. Following this the circuit designs are reduced to final size by means of a process camera and stabilized film.



A circuit layout in process is shown in these photographs, courtesy of the General Electric Co. The designer lays out the circuit in pencil *(left)* and turns it over to the draftsman who outlines the circuit path with a scriber *(center)*. Later he peels away unwanted areas from a duplicate of the original scribed layout *(right)*.

According to a GE spokesman, a new method of laying out printed circuits will save the General Electric Company's Heavy Military Electronics Department in Syracuse, N. Y. thousands of dollars annually, cut drafting time and provide greater accuracy and design flexibility than previously-used inking and taping methods.

H. A. Knowlton, General Electric drafting supervisor, estimates that the use of the new technique on 300 different circuit layouts has resulted in a saving of $27,000. GE is the first to use the system.

General Electric and Keuffel and Esser Co. reproduction experts attacked the problem of simplifying and making more exact the methods of laying down circuit paths and lands—the printed circuit equivalent of terminals—for subsequent photomechanical reproduction. Together GE and K&E adapted a method previously used in precision map making. GE spokesmen expressed the opinion that the method makes the usual inking and taping methods virtually obsolete for preparing large numbers of complex printed circuit layouts.

In practice the system begins with a designer's pencil drawing on a double-coated tracing film. The top coating is a diazo grid image, exposed and processed by a local supplier. The grid facilitates organization of the circuit.

The second layer of the film is a pigmented scribe coat. In this application the two salient features of the coating are that it is actinically opaque and that a clean line can be scribed through it to the clear polyester base of the film.

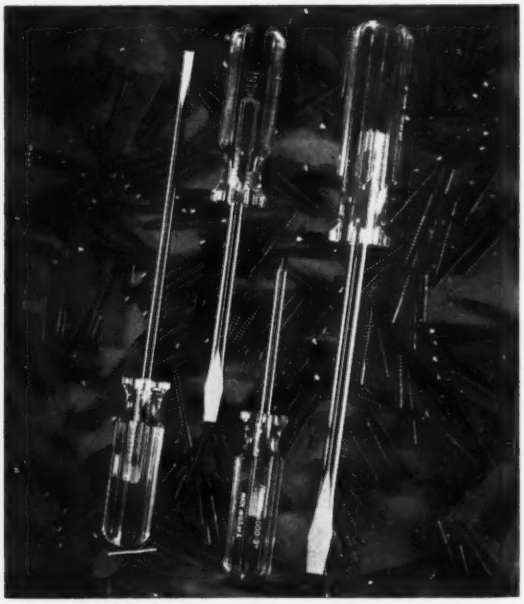
A draftsman takes over the circuit layout from the designer and scribes outlines of the circuit paths and lands with a set of tools specially designed for the process. Following this a photomechanical process described on the opposite page duplicates the scribed lines on a second sheet of film, this one coated with a pigmented peel coat in place of the scribe coat. The draftsman peels away this pigmented coating, either between the scribed lines or everywhere except between the lines. Thus he may produce either a negative or a positive circuit layout, depending on whether it is to be a plated or an etched circuit. Following this, the circuit layout is ready for reduction with a process camera and subsequent mechanical reproduction.

In describing the operation, GE said: "Three basic controls provide the new scribing system with a high degree of accuracy. First the steel alloy points (shaped like phonograph needles) are made in graduated widths (.0025 to .005 in.) and cut extremely sharp, precise lines. The use of constant width scribe points in turn eliminates minute variations in circuit line widths often resulting from pen and ink work, where the amount of ink in a pen can alter the line thickness and clarity.

"Second, the Stabilene film on which the scribing is done contains grid lines for accurate positioning of the board element. It has exceptional dimensional stability and permits precise reproduction. A re-stabilized Mylar polyester-base film developed by K&E, Stabilene maintains constant line character under extreme temperature and atmospheric conditions.

"Third, the scribing tools devised by General Electric and K&E engineers are equipped with unique spring-type shock absorbers. These instruments maintain the same accuracies on curved as well as straight lines, eliminating ragged circuit paths which make the (*continued on page* 91)

ROBERT PACKO, Toledo, Ohio, made this picture for the Toledo Chamber of Commerce. Assignment was to illustrate airport for display going into new Downtown Mall entitled "Advantages of Living in Toledo." He used an Eastman Kodak Master View 4 x 5 with a 90mm Super Angulon lens. Exposure was 1/25 sec. at f/22 on Ansco's Hypan film.



L. DAVANT MULL, Quincy, Ill., made this double exposure shot by placing screw drivers on a sheet of glass raised off the floor. Screws received ½ exposure.

ALFRED STATLER, New York, made this show while on assignment on the construction of the Seagram Bldg. Leica body, Nikkor f/1.4 lens, Plus-X, 1/100 sec., f/8.

PMI's Monthly

READERS' SHOWCASE

PMI's readers supply solutions to industrial photo problems

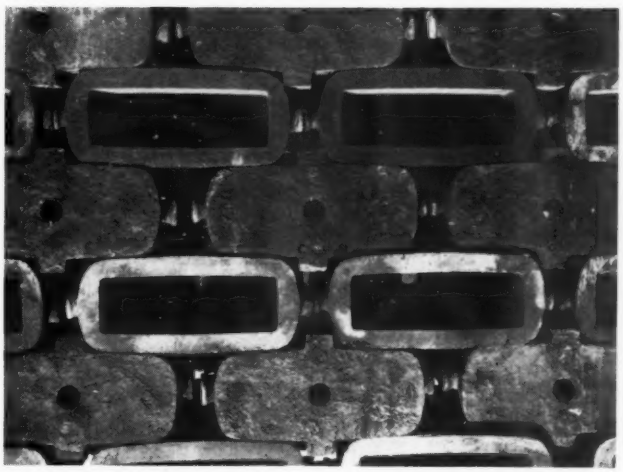
This issue begins a third year for PMI and for Readers' Showcase. It would seem, therefore, like a good time to look back over the first two years to see what, if anything, was achieved during this time. The impression is that there has been considerable improvement, not in the technical quality of the photographs, but in what might be termed pictorial fluency.

This might be defined as the ability to tell a story in pictures, but it is a great deal more. Among other things, it is handling old thoughts in a new way. It is a more effective arrangement of the pictorial elements of a scene. And most of all, it is the feeling that photography is part of industry, one of the family and not a stranger invited to drop in for special occasions: new boards of directors, a new factory, a retirement ceremony, etc. Industrial cameramen show industry as it really is—in shirtsleeves and overalls.

The why of this improvement is anybody's guess. Maybe it is the natural growth of a comparatively new field. Perhaps it is the result of more flexible materials with which to work. Whatever the reason, it indicates that the growth is mental as well as physical.

You are invited to send in your pictures for this feature. Here are the details:

There are two rewards for each of the pictures chosen. The first is knowing that your picture will be seen by appreciative fellow professionals. The second is $10.00. Please include your name and your company's name, a note about the picture and how it was used, and the technical data. Send them to SHOWCASE, PMI, 33 W. 60, New York 23, N. Y.



GEORGE EMRISEK, Allegheny Ludlum Steel Corp., Brackenridge, Pa., made this picture of neatly stacked ingot molds for the safety department to show good housekeeping habits. Pan Type B film was exposed for 1/100 sec. with 4 x 5 Speed Graphic.

JOHN CRANE, Photographer for Colonial Williamsburg, shot picture of Stan Croner at bottom of well. Croner was shooting film for Williamsburg's archeology lab. Plus-X, Nikon SP.

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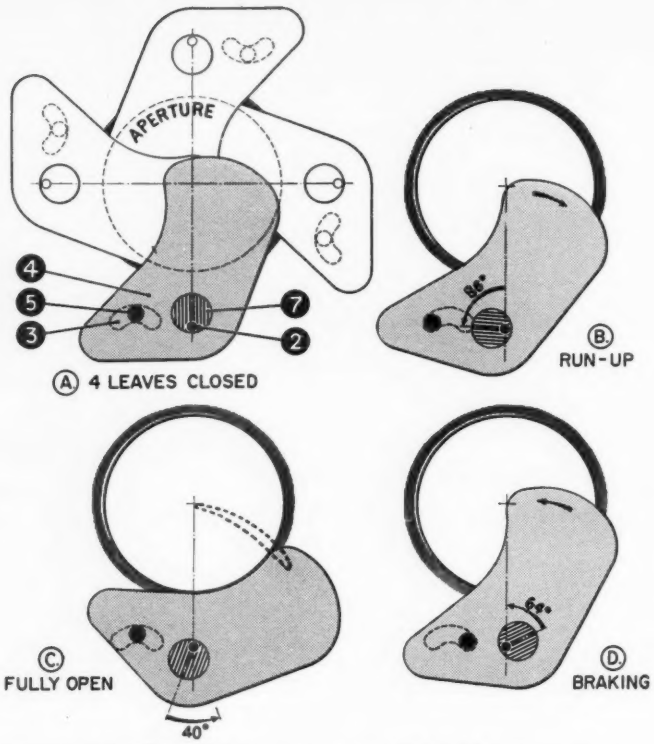


New Graphic 1000 shutter uses an elliptical movement to get a 1/1000 second top speed at full aperture

IN-PLANT TEST

Super Speed Graphic, 4 x 5 camera, with 135mm Optar f/4.5 lens in new Graphic 1000 shutter. Using new design, between-the-lens shutter has speeds from ½ to 1/1000 sec. M sync (to 1/750 sec) and X sync (to 1/1000 sec). Ribbed lens hood used for cocking shutter.

Joe Lyons, Chief Photographer at Colgate-Palmolive reports: The big news in the new Super Speed Graphic is a speed of 1/1000 sec. produced not with a focal plane shutter but with a between-the-lens shutter. What's more, this speed is not achieved as the result of reduced apertures; you can use it from f/32 to f/4.5.

The camera, introduced last November, is a new version of the current Super Graphic, having all the features of its predecessor including internal flash connections, revolving back, electronic shutter and flash tripper, etc. As such, it is a good all-around camera for photographers who need something more than a postage stamp negative.

It is the shutter, however, which really makes this camera stand out. Available only with a 135mm Optar lens (rumor has it that other lenses will be mounted in this shutter including telephoto and wide-angle optics) shutter has speed from ½ to 1/1000 sec. in a geometric ratio, ¼, ⅛, 1/15, 1/30, 1/60, 1/125, 1/250, 1/500, 1/750 and 1/1000.

A permanent lens hood is mounted on the shutter to serve as a cocking ring. To cock, just turn the ring, which is about 2 in. deep, as far as it will go clockwise. I found it very easy to use, far easier than fumbling with small levers. The shutter cannot be tripped unless it is fully cocked. If the cocking ring is turned only part way, the blades cannot open. The shutter can be tripped by using the red release button at the top of the camera, using the button on the battery case, using a cable release or simply pressing the shutter release lever at the side of the shutter.

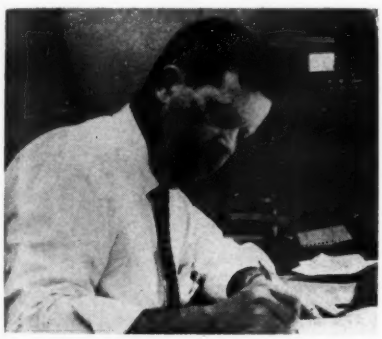
Shutter speeds can be set either before or after cocking. A press-focus button permits checking your ground glass. Turning the cocking ring counter-clockwise unscrews it, premitting insertion of a filter.

The high speed on this shutter is attained by using a new concept in shutter design. Most between-the-lens shutters involve a quick reversal of blade travel; the blades open, are then stopped and return to their original closed position. Here, the blade movement is eliptical.

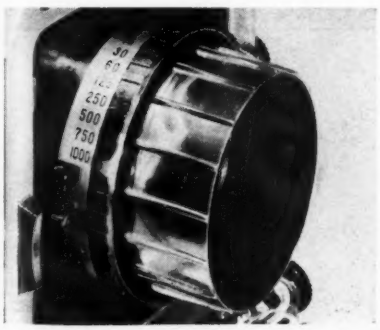
The four blades are mounted on eccentrics which revolve to open and close the shutter. In the first stage, the eccentric revolves 86° before the blade begins to open. Another 40° travel of the eccentric and the blades open completely. As the eccentric begins the third phases, a 64° rotation, the blades have already closed.

The practical effects of this design are more easily appreciated than the engineering aspects. However, for the working photographer, this system gives him not only a higher speed between-the-lens shutter but one which is more efficient.

The faster opening and closing result in more light passing through the lens during a given exposure with the Graphic shutter than with a conventional between-the-lens shutter set at the same speed. Instead of a gradual opening and closing, the pattern for the Graphic shutter shows a sharp curve as the shutter opens, a long peak at full opening, then a sharp drop to closing.



Joe Lyons, top photographer at Colgate-Palmolive, found new Graphic excellent.



Knurled lens hood is turned to cock Graphic 1000 shutter. It also holds filters.

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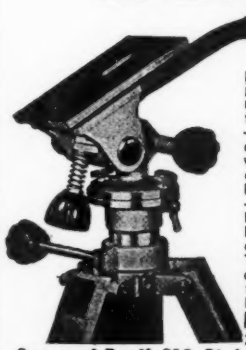

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COMMENTS ON STATIC

(*continued from page 41*)

These are also excellent, incidentally, for brushing off condensers, negative carriers, and so on. Although there is similar equipment made for industrial use, the Kodak equipment has been designed for photographic purposes; what's more, it works well. No discussion on the use of ionized atmosphere would be complete without mentioning the use of radioactive materials such as are used in atomizers and brushes sold to remove dust and neutralize film surface. My own experience with the brushes has been that they have a short life of real effectiveness. They are not used by most of the professional labs I know of, and many industrial medical departments have said they were dangerous because of the possibility of small flakes of radioactive material becoming dislodged and inhaled. I'm sticking my neck out in saying this, but several of the large film manufacturers have concurred with this opinion.

Unexposed film

Static which causes static marks on raw film (exposed or unexposed, but not yet developed) is perhaps the most annoying of all because its presence is often not detected until after development, and often its damage can not be repaired. Too, the specific source or moment at which the static discharge has occurred may be difficult to detect. Although static is not an overwhelming problem, it occurs with enough frequency to be considered a persistent gremlin. Many of the problems of both motion picture and still films, color and black-and-white, are all so similar that they can be discussed at the same time.

There has been some discussion as to whether the light emitted by the static charge is the sole cause of static markings or whether some electrical effect on the silver halide emulsion particles also contribute to the phenomenon. It is pretty well agreed, at present, that most of the effect is caused by the light produced by the discharge itself. There is also some heat produced by the spark and on infra-red films in particular, I believe some of the effect may be due to heat as well as the visible rays. It is interesting to note that most fast films are more sensitive to static marks than slower films and particularly those with extremely high sensitively to blue light and to short duration stimuli.

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The sparks themselves are predominately blue and last about 1/100,000 sec.

On negative materials static marks are normally black or of plus density and print light. On black-and-white reversal films they appear lighter than the surrounding background, and on reversal color films they may have some color depending on which particular layer or layers have been affected. Almost all films can be static marked although the faster films more commonly show the work of the static gremlins. It is interesting to note that such films as Kodachrome and Ektachrome Commercial 7255 motion picture film show very few evidences of static because the "rem-jet" backing is such a good conductor that it allows static charges to bleed off quickly. This backing is a carbon in a resin base, but it must be physically removed by rubbing or by violent fluid action, hence the name "rem-jet" meaning removable by a jet of fluid. This backing is one of the best anti-halation, anti-abrasion, and anti-static backings known, but its tricky removal limits its use to films which can be processed on special machines. Which is why it's not used on materials processed in small labs.

Static in the camera

Some still photographers once discovered that when they had static problems in their 35mm cameras they could de-stat the cameras by running a roll of Kodachrome through. Although this works, a better and more long lasting treatment is to clean a camera and wipe it down with one of the materials mentioned earlier. A few years ago there was an epidemic of static marking with certain 35mm films when used in certain cameras. It was found that some cameras (fine ones, too) had been put out with hard-glass pressure plates and these turned out to be great little static generators, especially with high-speed films. Almost all of these have been replaced, but if you have a miniature camera with a glass pressure plate and are having static problems, the manufacturer will replace it for you. Most 35mm cameras in use today have little static problem although the current trend of putting rapid winders on miniature cameras as well as rapid rewinds (even when speed of shooting or rewinding is not needed) has led to some problems, for it's the rapid motion that makes for fric-

(*continued on page 69*)

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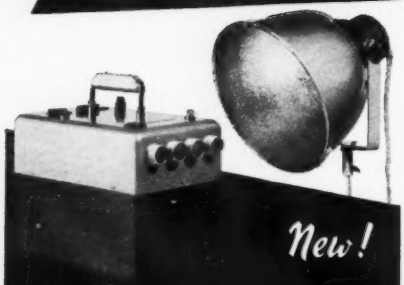

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Get more information. Circle 405, page 85

by Edward R. Farber

ELECTRONIC FLASH

Tales of woe and how to avoid—the use of slave units and cells

There seems to be a great deal of unhappiness with photoelectrically-controlled electronic flash units, particularly when used with portable units. After watching news, commercial and amateur photographers work with these "slave" units, I am convinced that most of the unhappiness stems more from lack of understanding of the device rather than from defects in their basic design.

Marginal operation can result from low battery voltage, high humidity or aging trigger tubes. Unfortunately, these situations are not easily detected. The unit may operate normally when contact triggered but not as a slave. Anti-humidity greases and varnishes, checks of battery and high voltages, checks of trigger and flashtubes *may* reveal difficulties. More often than not, however, the problem is the user.

It is best to regard the phototube as a wide-angle lens which must "see" enough light to "expose" the phototube. As a general rule, the phototube cannot be expected to function if the light on the area seen by the tube would not expose film.

Don't rely on spill

All too frequently, the spill from reflectors is relied upon. This was always poor practice but now it is even less advisable. Improvements in reflector design and the development of tiny flashtubes with the resultant improvement in efficiency mean that spill is reduced to the point where it is not possible to trip the slave.

This becomes more serious with the trend towards smaller, lower output units on the camera. Since the camera unit is usually used as the master, the problem is magnified. When it is possible to resort to bounce flash, things become much simpler and the slave photoelectric tube can be aimed at the ceiling too.

If several slaves are used, it is frequently possible to use a back light to trip those units not in the field of illumination of the master flash. Likewise, units can be tripped in sequence. I recall one industrial layout where Dave Eisendrath triggered a sequence of eight units that wound in, around, behind and back again. I believe it was Ralph Morse of *Life* who triggered a sequence of units down a street. Sometimes it pays to run two lamps to the master unit, one aimed for triggering the slaves. I have even seen lights aimed to the side or back to start off the slave flash set-up without contributing any fill light from the camera as even bounce might do. A similar method may be used outdoors when bounce works only on foggy nights. Don't overlook what slave operation can do to make your pictures have more punch and your layouts far easier.

Speaking of unhappiness, rechargeable batteries still bring a certain amount. Even the advent of nickel cadmium batteries has not eliminated every battery problem, although there, the greatest unhappiness is the cost.

Most flash units using wet cells operate at only two to six volts. This means that fairly high currents must be drawn. For example, a 60-watt-second unit, if it operated at 100 per cent efficiency, would have to be provided with ten watts average power for 6 sec. if it were to recycle in 6 sec. This would mean that five amps *average* would have to flow from a two-volt battery. In actual practice, it is even greater.

Keep terminals clean

The high currents and low voltage mean that absolute cleanliness of battery terminals and other low voltage connections is most important. Recycling time can be greatly extended and all the symptoms of a discharged battery indicated where even slightly dirty connections exist. Those who remember the grief caused by the invisible corrosion on the solder tips of wartime flash lamps can appreciate the problem.

Regardless of the type of battery,

(*continued on page* 64)

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ELECTRONIC FLASH

(*continued from page 62*)

it is good practice to recharge regularly and before the battery is completely exhausted. Obviously such habits mean the equipment is always ready. It also means that premature battery failure is less likely.

Lead acid cells sulfate

When lead acid batteries are allowed to stand in a discharged condition, they sulfate and the effective capacity of the battery is reduced.

Nickel cadmium batteries of *two or more* cells in series can be damaged by discharging at too low a voltage. This happens when one cell reaches discharge sooner than the other. The current flowing through this cell from the remaining cells will cause it to over-discharge and reversal of electrode polarity may occur.

Self-discharge of all types of cells occurs most readily at high temperatures. This is minimized with nickel cadmium cells but it does occur. Nickel cadmium cells that have been stored in a charged condition for months should not be charged immediately but should first be discharged. (Under normal conditions, never short circuit.) Discharging the cells first breaks down the oxide that forms on the cadmium electrodes. This is necessary since during operation, the cell oxygen must react with metallic cadmium in a sealed cell.

It is not possible to tell the number of flashes remaining in a nickel cadmium cell with float balls since the specific gravity of the electrolyte does not change. Keep track of the number of hours of use or the number of flashes. Better still, put on the charger regularly. A properly designed charger will not injure the battery by overcharge.

Battery bulletin

Note: The National Carbon Company has just issued Battery Engineering Bulletin No. 8 on its nickel cadmium cells. Write them at 30 E. 42nd St., New York 17, N. Y. for a copy. It is interesting reading for the technical minded.

Evaluation charts

For the price of a self-addressed stamped envelope, you can get a copy of my Electronic Flash Evaluation Sheet. Offered before, the supply ran out before all requests could be filled. A new supply is available now. Write to Flash Evaluation, PMI, 33 West 60th Street, New York 23, N. Y. The supply is limited so write SOON.—THE END

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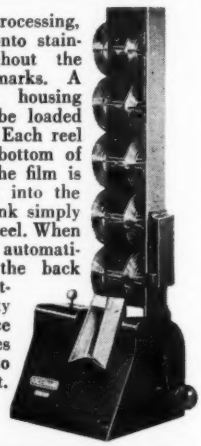

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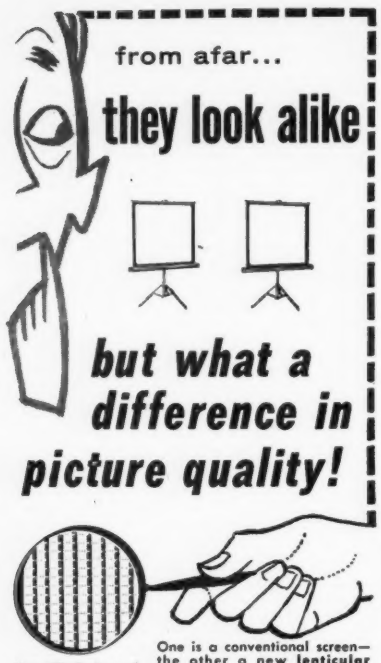

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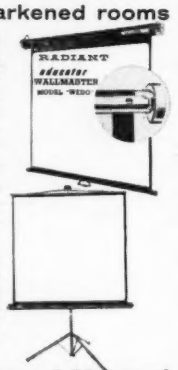

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Get more information. Circle 475, page 85

by Samuel Lang & Leonard Zoref

INDUSTRIAL COLOR

On the paraphernalia necessary, or useful, for prints in color

Often we've been asked about the equipment necessary for printing color negatives. Every photographer must, in the end, answer that question for himself. But we are glad to offer our impressions of the equipment with which we are familiar. We'll start this month with devices for exposing the print paper moving from the simple to the complex.

The first requisite is a tungsten head enlarger; most cold light heads are far too deficient in certain parts of the spectrum to be useful for color printing. There is one cold light source, however, which can be used. We will discuss this source later.

We cannot recommend the use of an enlarger without a color head. You must use filters, and inserting them in the optical path between negative and print causes a certain amount of diffusion.

At present, two sets of filters are are available for exposing color prints: Ansco printing foils, and Kodak color printing (CF) filters. Ansco's filters are available in seven density steps each, in yellow, magenta and cyan. The densities are as follows: .025, .05, .10, .20, .30, .40 and .50. The Kodak filters are available in four densities: magenta, yellow, cyan and red. Their densities are as follows: .05, .10, .20 and .40. In addition, Kodak supplies a 2B UV cut-off filter which is a permanent part of the pack. With the exception of this ultra-violet cut-off filter, we do not recommend intermixing—since each set consists of a slightly different version of the colors. We lean toward the Ansco filters because of the three extra steps available. It's really a fielder's choice, however. We have run extensive comparative tests and found both manufacturers' filters equal in performance. The filters' acetate base permits them to be cut to fit your enlarger. The sizes range from 4 x 4 in. to 11 x 14 in.

A filter head is available on Beseler enlargers between the condenser elements. The Omega's filter drawer is between the light source and the condensers. The Elwood's is above the negative. Although it is advantageous to have the filters far away from the negative—all above equipment is perfectly acceptable for making excellent prints in small amounts.

When a larger volume of prints is made, the filters take a terrific beating and have to be changed frequently. For some time, a color head with the filters permanently mounted on pivoting slides has been available from Lektra Labs, Inc., 154 11th Ave., New York 11, N.Y. This color head is currently made for the Beseler, Omega, and Leitz Focomat enlargers. As the filters are never touched, their life is tremendously increased. Since they are 5 to 6 in. from the negative, the chance of imaging any dust that may alight on the filters is remote.

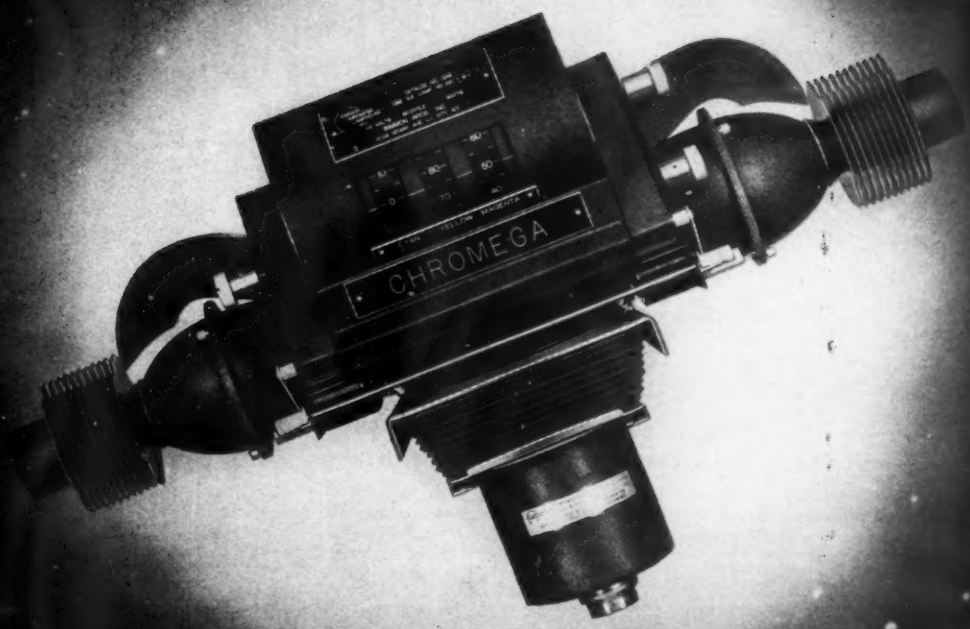
Another technique of filtering the negatives is the indirect method, employed by the Agfa colorhead, and the Simmons Chromega. The Agfa colorhead uses a color wedge which is inserted in the path of light and is continuously adjustable. The Chromega uses three circular step wedges with two light sources. Here, as in the Agfa head, the density of correction is continuously variable. We prefer the Chromega because the calibration is not compressed in the higher densities.

Still another light source available is the Arista color head. This is the exception to the rule against cold light sources. It uses multi-colored intertwined cold light tubes—each emitting light of a different color. With the use of a calibrated transformer rheostat, the intensity of each tube can be varied, thus changing the color of the light. We have seen excellent prints made with it.

From here on the exposing equipment becomes more complex and elaborate, and also quite expensive.

(*continued on page* 68)

a new world of COLOR



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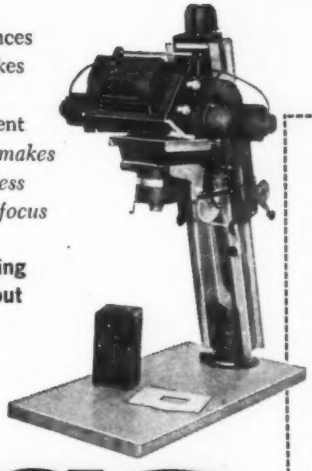

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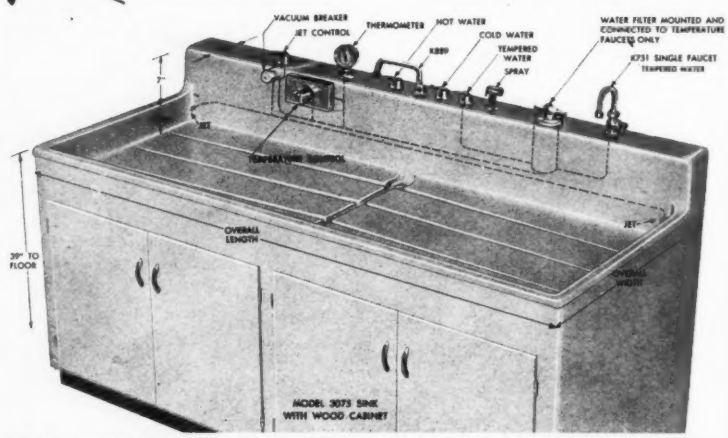

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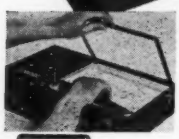

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INDUSTRIAL COLOR

(*continued from page 66*)

Simmon Bros. and Pako offer a tricolor computer which integrates paper characteristics and light flux through the enlarging lens. It then times the exposure. Another unit, the Densi-Color Analyzer, is an electronic brain which also simplifies the life of the photographer.

Computing exposure

Although the above is by no means an exhaustive treatment of the field, we'd like to turn from it to discuss another important aspect of exposing color negatives: the fact that the photographer must have some means for computing exposure time. This of course can be done with the paper itself, that is, with test strips. But to our minds color printing is complex enough that some sort of printing meter is advisable. We have found that the best method is reading the highest density of the negative at the easel. This presents a problem due to the high densities encountered. A chart on page 50, presents the specifications of print meters which solve this problem.

An ordinary selenium cell does not have enough sensitivity to read highlights at the easel. In the past few years there have been tremendous strides in perfecting highly sensitive electronic photo multiplier probes. One of these is made by the Photovolt Co.; and the Electro-Physics Co. makes one they call the Printometer. The aperture of the Printometer is about 1/16 in., highly desirable as it is easier to read a highlight without getting a false reading from an adjacent, less dense area. The meter is sensitive enough to read a maximum enlargement with a lens stopped down to working aperture. Thus computation is all but eliminated. A model of the Welch Densichron is about equal in sensitivity to the Printometer.

The Macbeth Co. has just introduced their instrument called the Quanta-Log. This is one of the most sensitive color print meters we have seen to date, although manufacturers are constantly developing even more sensitive units. The reading scale is four times the size of the ordinary photoprobe meter. This sensitivity makes it possible to read through color analyzing filters so that you can not only compute exposure time, you can also compute color balance at the easel. In our opinion this convenience results in dollars and cents savings of time and materials, making such a unit practical for even a one-man darkroom.—THE END

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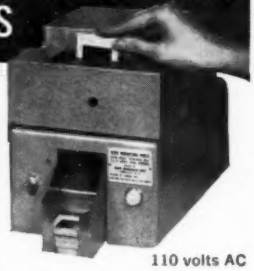

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STATIC

(*continued from page* 61)

tion and builds up static. Be sure there are no rough spots or burrs or sharp points near a film path; they may not only create friction (and static) but act as small lightening rods attracting a discharge. Be sure that cameras are kept very clean and all rollers, sprocket drives, and bearings move freely, for rubbing film over them also may make marks. And on dry days and under very cold conditions, be especially sure to wind and rewind slowly and smoothly.

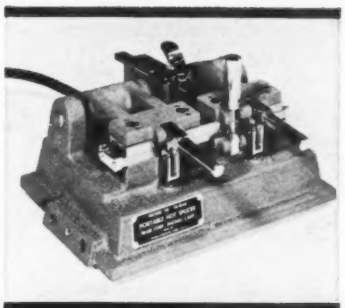
Static and cassettes

There's been some discussion about static being caused by film cassettes in the case of 35mm material. Both plastic spools and some light traps, together with film and motion, may have a tendency to generate static. Under such conditions, spooling or unloading films through the light trap should be avoided. If you load your own film in cartridges and re-load commercial cartridges and are having static problems, try wiping the cartridge with one of the anti-static materials we've mentioned. And be sure the fabric light traps are kept clean. Keeping cameras clean, lubricated, and wiped with anti-static solutions is one of the best ways to beat in-camera static; this and slow winding and rewinding. However, there has been occasional static that occurs in cassettes from tight winding, or from winding a short roll and then allowing it to unwind like a clock-spring in the cartridge case. The friction of the unlike surfaces (front and back of the film), tends to create static. Special care must be taken with roll film if development is done in deep-tanks to see that film is hung and unwound slowly. An operator who is a "Hot Charlie" can sometimes produce a fine fireworks display by suddenly whipping open a roll of film under certain conditions. Remember, it's the fast motions that cause static.

Shuffled sheet film

Sheet film gets a static charge from being shufflled together when, for example, a stack of unloaded film is gathered togethered to be put into a box or to be loaded into hangers. Oil cloth and plastic table tops are great offenders, too. When loading sheet film into holders from a new box of film it's smart to place the film emulsion side down on your loading bench so that each

(*continued on page* 76)



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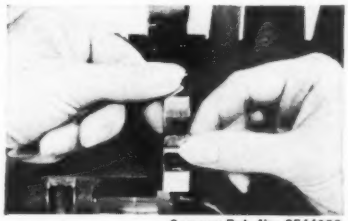

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Wisconsin physicist-engineer William G. Hyzer has a national reputation for his expertise in high-speed motion analysis. Here he presents two techniques to ease the life of the practical photo instrumentation worker

HYZER ON HIGH SPEED

CHART FOR DETERMINATION OF OPTIMUM FOCUS

Frequently the photographer is compelled to photograph with optimum clarity, two subjects or subject areas that occur at different distances from the camera. For instance, two projectiles are to be photographed which pass simultaneously through the field of view 6 and 10 ft. from the camera. At what distance should the camera lens be set to obtain optimum focus for both subjects? This question is answered quickly by reference to the chart below. If the near focus point is 6 ft. and the point of far focus is 10 ft., the intersection of these two lines on the chart coincide with the loci of optimum focus, which is approximately 7½ ft. Example 2: If the point of near focus is 10 in. and the point of far focus is 30 in., optimum focus occurs 15 in. from the lens.

The chart is based on a very simple, but accurate mathematical relationship:

$$O = \frac{2N \times F}{N + F}$$

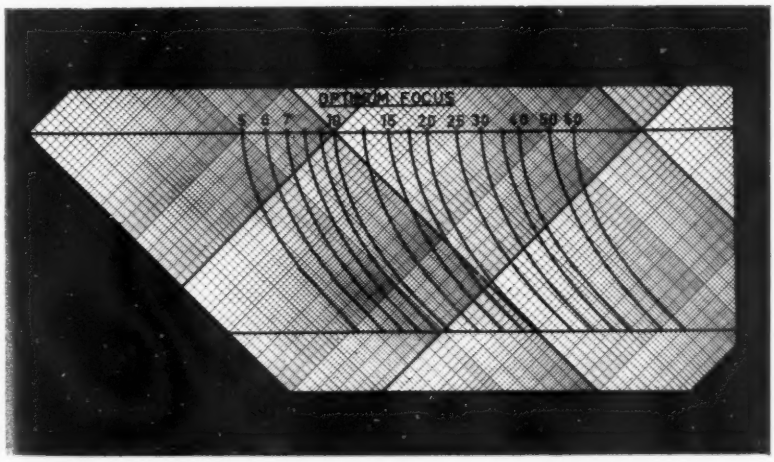
O is the distance of optimum focus, N is the distance of near focus, and F is the distance of far focus, all in equivalent dimensions.

Example 3: Photography of a rocket propelled sled requires panning the camera to follow the sled from a far distance of 4000 ft. to a near distance of 500 ft. At what intermediate distance should the camera be focused for optimum resolution?

Answer:

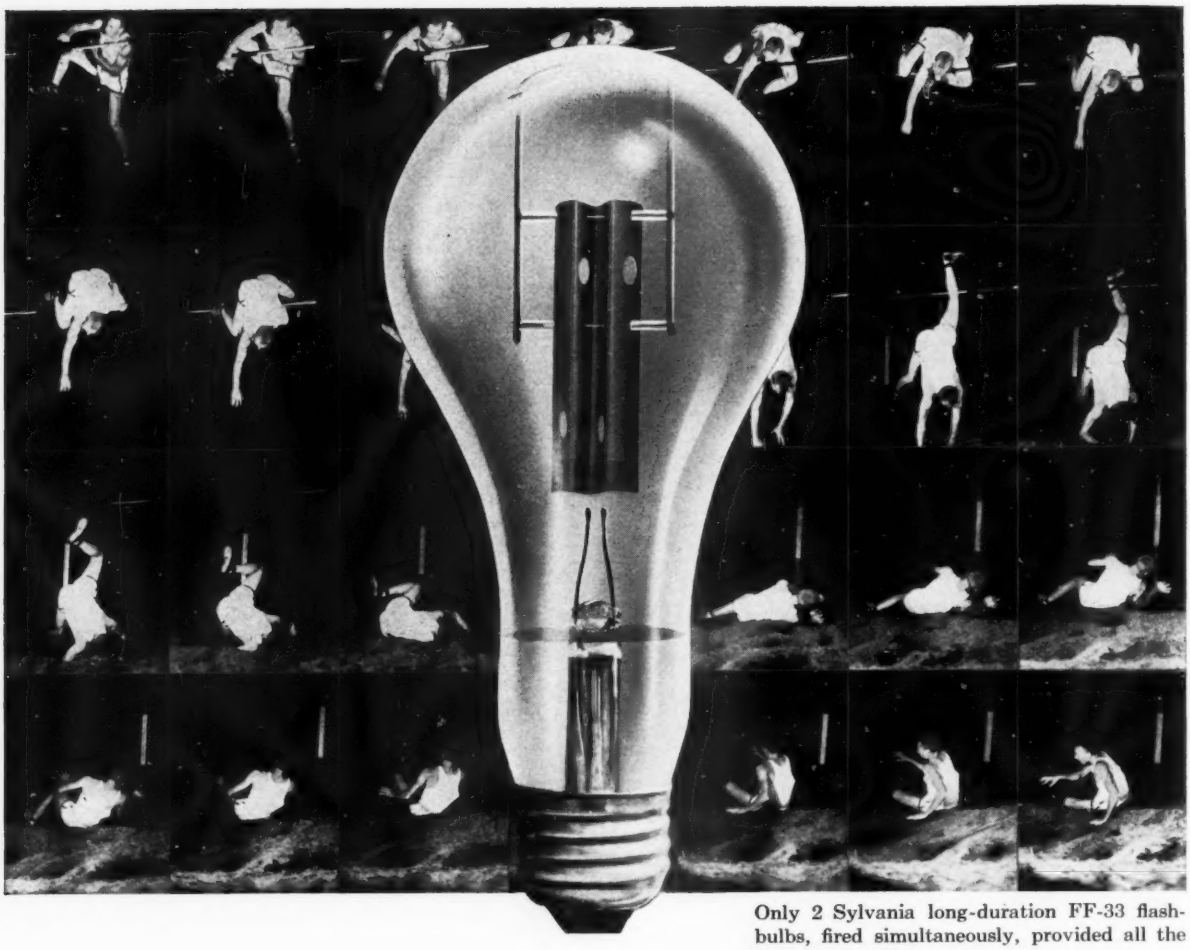
$$O = \frac{2N \times F}{N + F} = \frac{2 \times 500 \times 4000}{500 + 4000}$$

O = 890 ft.



AN IMPROVISED FILM DEVELOPING TANK:

The determination of correct exposure in high speed photography is not ordinarily a difficult task if the subject matter is typical and lends itself to conventional methods of exposure determination. Adverse lighting conditions and abnormal subjects, however, complicate what is otherwise a simple problem. After the first film is run through the camera, defective results based on faulty operation of equipment, errors in judgement, or routine mishaps can often be detected immediately if a segment of the film is processed on location. An improvised developing tank can be readily fabricated from two film cans, see above figure, which has proved to be quite adequate for the quick processing of a 12-in. loop of 16mm film taken from the trailing end of the film roll. The covers from two film cans are punched with a beer can opener and bent with a pliers to provide a pouring spout for the developing solutions; then the covers are taped together one on top of the other using plastic electrical tape with the holes displaced about 45° to 60° to produce a light trap. A 12-in. film segment is cut from near the end of the roll inside of a changing bag or dark closet. The film is bent into a loop, emulsion side in, and the two ends fastened together with a steel paper clip, then loaded into the improvised tank. The double cover is reassembled onto the lower part of the can and taped into place. Processing is carried out in direct light using only a few ounces of processing solution. Suggested development for Kodak Tri-X Reversal or Du Pont 931 film is about 6 to 8 min. in D-19 developer. Effective exposure index of the films under these processing conditions is usually within ½ to 1 stop of that obtained by normal reversal or negative processing.—THE END



Only 2 Sylvania long-duration FF-33 flashbulbs, fired simultaneously, provided all the light for this 28-frame sequence exposure.

How Sylvania's new FF-33 long-duration flashbulbs provided light for this 28-frame sequence photography

Mr. Howard Hammersley, Jr., Photo Manager of The Roanoke Times and The Roanoke World-News, reports: "The 1.75-second duration of the new Sylvania FF-33 flashbulbs gave me all the light to take these 28 frames. Using a Hulcher 70 camera equipped with 162mm lens, I fired at 20 frames per second, shutter speed of 1/720 of a second.

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THE PICTURE WEIGHS 3/4 TON

Cosmic ray study requires Navy task force to fly unprecedented load of photo emulsion over Atlantic

As this reaches PMI readers, a Navy task force consisting of an aircraft carrier, air support and destroyers may have completed a voyage into the South Atlantic to help a university professor make two pictures.

The pictures, it is hoped, will be unique. Certainly the "film" for them is. It consists of two stacks of nuclear emulsion weighing about three quarters of a ton and containing enough silver for a million rolls of camera film. It is said to be the largest quantity ever ordered and it cost $100,000.

The 160 liters of nuclear emulsion, in 500-layer stacks measuring 60 x 45 x 30cm, will be transported in specially-constructed gondolas by 10-million cubic ft. balloons to heights of 120,000 ft. in order to expose them to a rain of high energy nuclear particles.

As these very high energy cosmic rays penetrate the photographic emulsions at high altitudes, they will collide with the nuclei of the emulsion to cause showers or "jets" of other fast particles, producing a chain of nuclear interactions recorded in the photographic blocks. From this record scientists hope to be able to learn more about physical laws ranging from the nature and behavior of the smallest elementary particles to the creation of cosmic radiation on a galactic scale.

The project is under the direction of Prof. Marcel Schein, the University of Chicago. Prof. Schein explained that currently the largest linear accelerator, in Geneva, Switzerland, is a 25-billion-volt unit. The project may indicate a need for study of events that would occur artificially only with a 100-billion-volt accelerator. The construction and employment of such a unit might not only involve expenditures of a quarter of a billion dollars, but likely more important, the deployment of a great group of scarce scientific personnel. Prof. Schein is conducting his work on a $625,000 National Science Foundation grant. The Office of Naval Research is augmenting the grant with the Navy personnel and equipment necessary.

The National Science Foundation pointed out that: "While there are theories to explain interactions of nuclear particles at low energy levels, there is no satisfactory explanation of particle behavior at these extremely high energies, energies reaching more than 100 times the 25-Bev energy produced by the Cern accelerator at Geneva. The formation of a more satisfactory relativistic theory of very high energy phenomena may be an important outcome of this project."

The balloons will be launched from an aircraft carrier. By sailing with the wind, the carrier will be able to neutralize any breezes present. A null wind condition is necessary for launching the balloons. A meteorological survey will give an indication of the path and speed of the balloon's flight. But it is possible that at the altitudes they will encounter, their speed will far exceed that of surface craft, hence the need for planes and a radio signal system for tracking.

Prof. Schein explained that a sea recovery would be less haphazard than one on land. The destroyers will be deployed to effect the recovery after the balloons are partially deflated via radio signal.

The area of the launch has been selected because it is near the equator where the earth's magnetic field is strongest. This field provides a barrier to low energy cosmic rays up to about 10 Bev, effectively filtering them out. Sending up an unusually large block of emulsion to very high altitudes for a long period of time provides definite advantages. The large area of the block appreciably increases the number of high energy particles detected. Because it is a stack of emulsion sheets, the nuclear events can be traced in three dimensions rather than just two. And the depth of the emulsion block allows detection of many complete events, that is, the entire chain of secondary interactions started by each primary particle.

The high altitude is required so that primary particles will be captured before they have collided with particles in the atmosphere and become secondary particles of lower energy. The longer the balloon remains aloft, the greater the number of events that can be recorded; thus a balloon has distinct advantages over a rocket in this respect.

An earth satellite cannot be used because it would pass through the Van Allen radiation belts that would fog the emulsion.

A new plant was designed and executed under Prof. Schein's direction. It stands ready in the University of Chicago's capacious Michelson laboratories. Special equipment was made to facilitate the separation of the 500-layer stacks, their processing and alcohol drying as quickly after exposure as possible. Prof. Schein mentioned that an attempt will be made to recover as much silver from the hypo as practicable.

The events under study are microscopic collisions which "expose" the silver halide emulsion. Since the study of such a quantity of emulsion is too large a job for any single laboratory the work will be divided among 25 research institutions throughout the world, and will include at least one scientist from a Communist country. The intention is to make the results of the project a matter of international cooperation.

The emulsion will be dissected into 16,000 pieces, each of which will be examined microscopically. It is estimated that the work will require two years.

The material, called G5 nuclear emulsion, was purchased from Ilford, Ltd., of England, supplier of most nuclear emulsion in the western world. Accompanied by University of Chicago research aide, David M. Haskins, it was flown by jet from London December 31, and arrived in Chicago the following day.—THE END

Here's a laboratory camera that can photograph any size subject...

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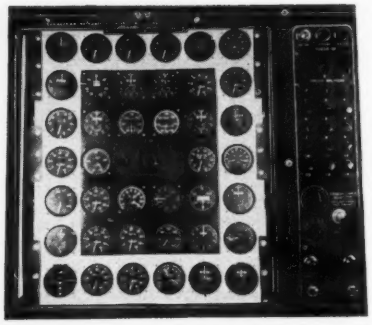

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by Ernest E. Reshovsky

PHOTO INSTRUMENTATION

Why buy a cow to get one glass of milk, or renting can save money

It is sometimes expedient and wise, as well as money saving, to contract for photo instrumentation with photo instrumentation experts. Such was the case when U.S. Flare Division of Atlantic Research Co. in Saugus, Calif. needed information on a research and testing project and needed it fast. The testing was done on 81mm illuminating mortar shells, which U.S. Flare is manufacturing under contract with the U.S. Army's Picatinny Arsenal in New Jersey.

The shells under test are designed to illuminate a battle field with an intensity of one million ft/candles while they dangle from a parachute.

The data required was velocity, pitch and yaw, trajectory and most of all general behavior of the parachute during opening.

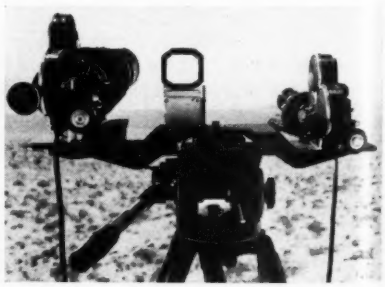
Photo data—to hire or to buy

E. N. Jacobs, the project engineer with U. S. Flare, felt that photo instrumentation would give him some of the answers. Not having a photo lab equipped to handle the required camera installations, and for that matter, not owning the equipment needed for the job, two choices were open to him. Either the company bought several high-speed motion picture cameras with all the necessary accessory equipment such as timing lights, generators, lenses, tripods, finders, etc. and hired a staff to operate them for the field tests, or the whole job was to be contracted out. The latter course was decided upon and that's where Gordon Enterprises of N. Hollywood, Calif., a firm specializing in sale and rental of equipment came in.

Grant Loucks, one of Gordon's photo instrumentation consultants, took the project in hand. In discussions with E. N. Jacobs and his staff, he decided on the equipment he would need to provide the required footage for U.S. Flare.

At the U.S. Flare test site in Saugus, Calif., four high-speed motion analysis cameras (Fairchild H.S. 101) were set up on a hill parallel to the horizontal path along which the test shots were to be fired. The cameras, equipped with 13mm; f/1.2 Elgeet lenses, were oriented so that their angle of coverage overlapped slightly. Since the flare is slowed along its path by the drag of the parachute, the speed of the four cameras was staggered. Cameras 1 and 2 operated at 3000 fps; camera 3 at 2000 fps and camera 4 at 1000 fps. Along the trajectory path, numbered stakes were aligned at 10-ft. intervals and timing lights were placed in the cameras field of view to aid in reading-out data on the processed film.

On each test, a goose control programmer started the four cameras and then fired the mortar shell through a piece of plywood, which ignited the fuse. As the flare traveled along its horizontal test path it entered the fields of the cameras successively with enough overlap for effective splicing of the footage. Naturally a lot of film was exposed before and after the flare passed through each camera field. Having a 4-sec. film capacity at 1000 fps at which camera 4 operated as opposed to a travel time of 2 sec. before the shell entered the field of the last camera, Loucks felt safe in not staggering the start of the cameras. Staggered starts would have complicated the field set up considerably.



Descent rate and parachute action were recorded with this twin Arri rig.

On each shot a total of 400 ft. of film was exposed, since the cameras were run "dry" after having been started. Out of this footage, according to Jacobs, "we got about 250 frames of very useful information. As a matter of fact separation characteristics of the components of the shell could only have been recorded photographically. As a 'bonus' we often got additional data, like when the tail cone went through the parachute instead of to the side of it; we varied the assembly techniques and licked that problem. Burning shroud lines also gave trouble in the initial stage of testing and the film showed us where it was. After that, we could easily rectify that problem also."

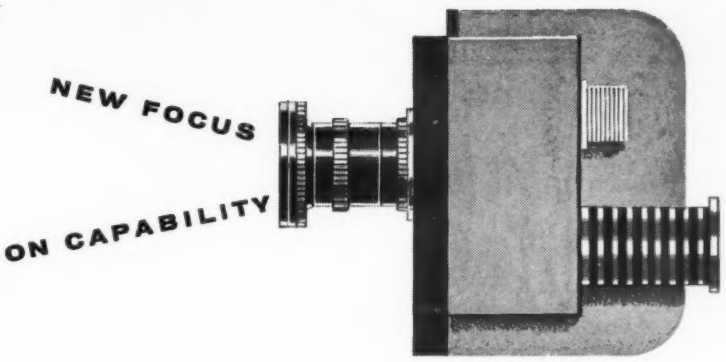
In addition to the described "close camera" set-up another series of films were taken to examine the descent rate and parachute action. This was shot on two 16mm Arriflexes, mounted together on a flying bridge atop a fluid pan head equipped tripod. The two cameras equipped with a 300mm f/4.5 Kilfitt and a 640mm f/5.6 Astro respectively, were bore sighted to a Bell & Howell high contrast glass tracking finder. Shooting Super Anscochrome at 50 fps, Loucks tracked the flares manually as they ignited in the sky. Distance between the target and cameras was about 3500-4000 yds., but because desert air is very clear, the footage "was very valuable to our understanding of exactly what took place when the chute opened on the flare," said Jacobs.

Cost—the ultimate test

The whole photo instrumentation phase on the tests took place between February 1959 and October, 1959. Careful cost accounting was done by U.S. Flare. In the final analysis the total cost for the photo instrumentation project was $6987.72.

Camera rental was $1562.50, with $1964.70 going to the photographer. They spent $2159.85 on black-and-white film, $249.90 on color film and $1025.89 on processing.

"For the money we spent on the whole job we could have just about bought four high-speed cameras, considering that the list price of the Fairchild H.S. 101 is around $1400. We still would not have had a foot of film, and had to buy all the accessories, such as generators, lenses, timing lights etc. and pay a photo instrumentation expert to operate the set-up. For a project such as this, contracting the job to an outside firm obviously was the answer and in addition to money, we saved a great deal of time," concluded Jacobs, who is quite satisfied with the results.



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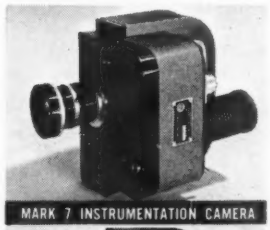
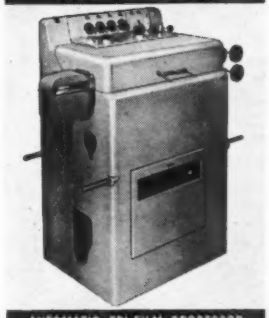

MARK 7 INSTRUMENTATION CAMERA

MARK 8 AERIAL CAMERA

TYPE 320 70mm CAMERA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STATIC

(*continued from page* 69)

sheet of interleaf paper is removed from the *back* of each sheet rather than being brushed across the emulsion side. Static marks are also caused by discharges from darkslides; we've discussed this previously. Film packs are particularly liable to be static makers, especially in cold, dry weather, for these thin based films make a complete bend over a narrow diameter where there is very close contact of surfaces, as well as deformation of the material itself; both effects being conducive to static making. Pull slowly!

I mentioned earlier that motion picture film might be subject to static in conditions of high humidity, as well as in dry weather. This is also true of still camera films. Under very high humidity conditions emulsions soften a bit. If the humidity is then reduced slightly, there may be a greater surface contact between the emulsion and interleaving paper, or between emulsion and base for materials stacked without paper or in the case of 35mm film.

Variety of shapes

Static marks take on a variety of shapes, some familiar, but many not suggestive of static discharge. Although it may or may not be helpful in tracking down the source by knowing the direction in which the charge takes place, you should know that static moves from the negative charged surface to a positive charged one. The static mark that looks like a tree-trunk, lightning flash, or has long fingers is caused when film has a negative charge. Careful examination will show where the electricity has flowed to a point of discharge. Feather or spot shaped marks, or dots and streaks, dotted lines, wavey lines or fingerprint discharge marks, are caused when a film has a positive charge and the static has jumped *from* a negatively charged object *to* the film. Sometimes when small spot marks are examined closely you can see tiny clear spots which show the outline of a dust particle, the dust acting like an attracting lightning rod. Small "bead" or "pearl necklace" static marks are caused by roll, 35mm. or motion picture film being rubbed by the hands. On motion picture film "bar static" (a streak that makes a bar across the film) is caused when a tight roll is unwound and a static charge jumps to another part of the

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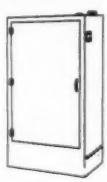
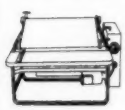


Handles rolls or cut film. Heat controlled, filtered air drying.

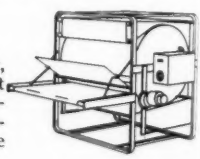
Capacity 50-120 Rolls, or 50 8 x 10 or 100 5 x 7 cut films.

Model PS-14 PRINT STRAIGHTENER



Automatically removes curl from glossy or matte prints as fast as you can feed them. Vaporizer prevents cracking of print emulsion.

Model A-G GLOSSY DRYER



Seamless cylinder, 22 in. wide print feed apron. Thermostat heat control, variable speed control.

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film, to the still tightly wound roll, or to a roller or camera part.

High-speed motion picture cameras have particularly bad static problems due to the extremely high-speed at which the supply spool is unwound. Bill Hyzer, PMI's high-speed consultant, tells me that he has been experimenting with the use of stainless steel rollers in place of fiber or aluminum and has found some improvement. He notes that infra-red is a special offender in high-speed cameras.

More recently Hyzer reports he has found an excellent technique for diminishing static in high-speed cameras with fiber rollers by coating the fiber thoroughly with Aquadag, a water soluble colloidal dispersion of graphite. If the spool is coated all the way to the bearings, and they and the camera are grounded, excellent conductivity of static is effected. Under bad static conditions he also has rewound film (slowly) to a looser roll before shooting, which also helps. The latter technique tending to reduce the adhesive bonding between layers and to provide less tension. In high-speed cameras of the type where film is unwound from a supply spool to a take-up spool, it's particularly important to keep all moving parts clean and be sure broken bits of film and all kinds of dust are removed frequently. Under some conditions grounding a high-speed camera helps, but you must be sure that all parts have good ground connections. The contact of dissimilar surfaces is a special problem with high-speed cameras, for so often these cameras are used on location where temperature and humidity differ from the conditions under which the film was originally spooled.

The static gremlins, as you see, are complex, persistent, annoying, and unpredictable. There are two major ways to help eliminate them. Use grounding equipment or treatment to allow easy dissipation of accumulated charges, and employ careful handling techniques with film.—THE END

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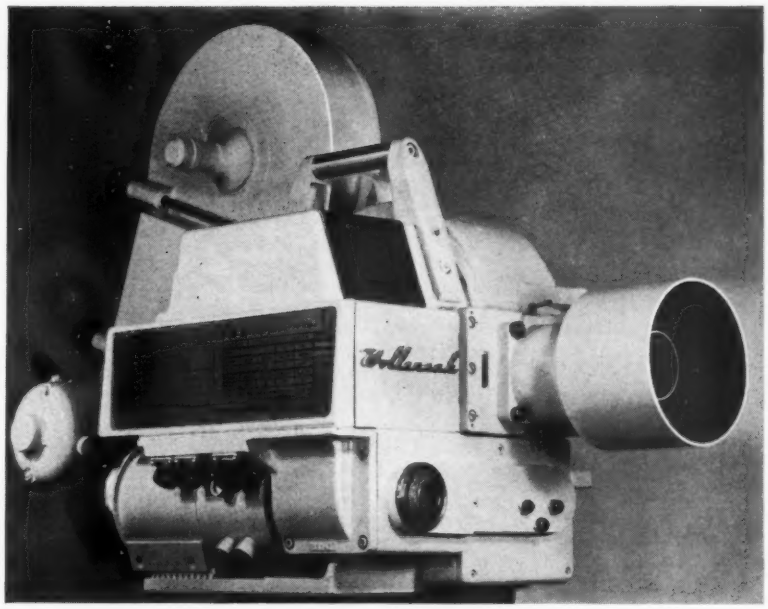

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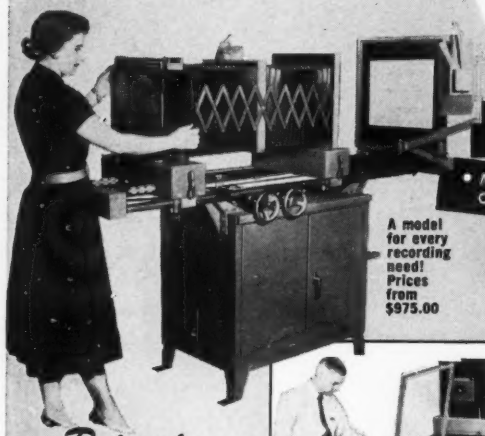

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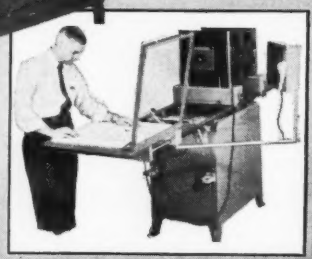

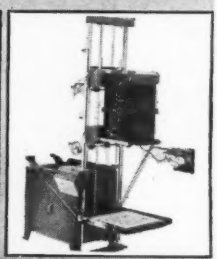

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AT LAST! HANGERS DESIGNED FOR FILM . . .

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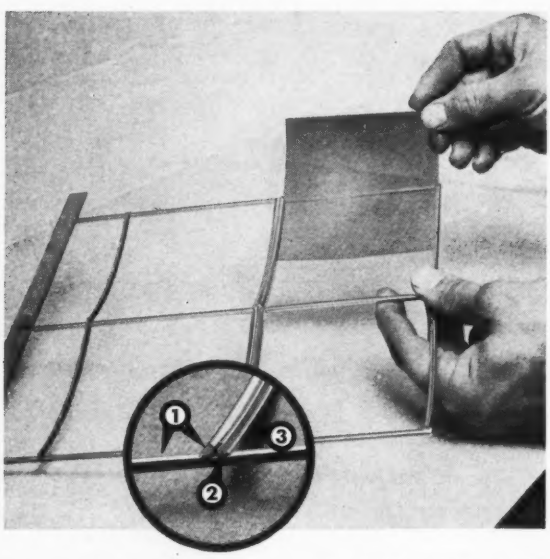

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TOMORROW'S HANGERS WERE SPECIFICALLY DESIGNED TO OVERCOME SPOTTING AND STREAKING INHERENT IN THE USE OF CONVENTIONAL HANGERS, GRADE 316 STAINLESS STEEL THROUGHOUT. THINLINE DESIGN ALLOWS USE OF MORE HANGERS IN STANDARD TANKS.

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3. FILM IS SECURED BY OPPOSED GROOVES, CURVING FILM TO INHIBIT BUCKLING.

TOMORROW inc. TUCSON, ARIZONA

Get more information. Circle 494, page 85

TPR

(*continued from page 35*)

such a system must be modified for TPR. Instead of using a plane light source, line light sources are necessary. These are imaged on a set of bars in front of the projection lens. If only clear film is in the slide holder no light will reach the screen under these circumstances. However, if ripples are present on the film surface at any particular point they will scatter the light so that it can get through the bar system. As Dr. Glenn put it, "The bar system acts somewhat like a shutter that allows light to pass wherever there is a ripple on the film. Whenever light passes through the projection lens, it images the ripple on the screen as a white spot." It is obvious then that if a film has the proper distribution of ripples on its surface it can form a picture image in all tones from black to white on a screen.

TPR in color

The great amount of information that can be recorded per unit area in TPR allows for multiple scanning of the plastic surface so that three color signals can be used for color reproduction. However, a further modification of the projection system is necessary. This can be explained by reference to Fig. 5. Each picture element has in it a set of ripples that form a tiny diffraction grating. The light diffracted by this grating forms a spectrum on each side of the central beam. The slots are made small enough so that only one color from the spectrum gets through to the projection lens, and thus to the screen. Different colors from different areas of an image are produced simply by changing the spacing of the grating during the formation of the ripples on the film.

Possible applications

In discussing the potential of the system Dr. Guy Suits, vice president and director of research at GE said: "The information storage capability of TPR is almost incredible. In principle, TPR could record the 24 volumes of the Encyclopaedia Britannica on a reel the size of a spool of thread, and it would take only a minute to record each volume. In addition, the information can be erased easily, and the tape will record both images and sequential information. We believe that the full development of the method may present a key solution

(*continued on page 80*)

ANSCO CHANGES BLACK-AND-WHITE INDEXES

ANSCO REVISED EXPOSURE INDEXES	Daylight	Tungsten
SHEET		
Super Hypan	500*	400*
Triple S Pan	400	320
Superpan Press	200	160
Versapan	100	80
Superpan Portrait	100	80
Super Hy-Ortho	250*	125*
Commercial	50	12
Commercial Ortho	50	25
ROLL AND PACK		
Super Hypan	500	400
All-Weather Pan	125	100
35MM		
Super Hypan	500*	400*

The following is reprinted from the *Ansco Finisher News and Technical Bulletin*, Vol. 3, No. 6, Nov.-Dec., 1959:

The Ansco Exposure Indexes for black-and-white films have been revised to remove most of the 1 1/3 exposure stop "safety factor" previously included in film rated under present ASA recommendations. This new rating system, which results in approximately doubling the old speed indexes, is designed to conform to a proposed revision of the ASA standard.

The Ansco announcement, made to its field force in August, begins a new consumer education campaign in the photographic industry. Other photographic manufacturers are expected to revise their indexes when the proposed ASA change is adopted.

The present ASA method for determining exposure indexes is based on first determining the minimum negative exposure necessary to produce a quality print and then adding a one and one-third stop safety factor. This produced a negative suited primarily for contact printing.

When photographers used this lower index their negatives were overexposed by 1 1/3 stops. Shorter exposures without the safety factor, as long as they provide adequate shadow detail, give finer grain, better resolution and acutance and generally better quality. Under the new Ansco ratings only the *ratings* are changed. The film sensitivity has not changed.

It is expected that this new rating system will take some time to put into use as Ansco revises its exposure tables, instructions sheets, and other releases to the public. Color films are not affected by this change since a "safety factor" is not included in their rating.

RY BLACK AND WHITE FILM
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the PRACTICAL WAY!

Remove film drying bottlenecks, cut drying time with a modern, economical Pako Model 2 or 2D Drycab. Each occupies less than 6 sq. ft. of floor space, yet holds up to 50 rolls of amateur film, 60 rolls color film, 100—5 x 7 or 4 x 5 films or 50—8 x 10's.

Model 2 Drycab

Forced, warm, filtered air, thermostatically controlled, circulates through the drying cabinet giving fast, safe, uniform drying. For roll film, cut film, and film packs of black and white film or color film and prints. Average drying time 45 min. Through-the-wall installation available for added efficiency.

Model 2D Drycab

Fast film drying using less heat, with the new self-contained dehydration unit. Consistent uniform drying year around. Moisture is removed by refrigeration. No vent required. For Black and White Film, ideal for Color Films and Prints. Drying time B/W 10 to 15 minutes; Color 20 to 25 minutes.

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saves time and money *SIX WAYS* while doing a better job:

1. Reads 3 colors simultaneously.
2. Scans each color, and indicates proper CC filters to use for correct color balance.
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6. Gives a quicker, better color print ON FIRST EXPOSURE!

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Large head which is for color balance only, swings over and above the easel. Reads RED — GREEN — BLUE simultaneously. The small head reads the amount of color-balanced white light hitting the paper and exposure in seconds is indicated on the exposure meter of the operator's console.

For further information write:

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Get more information. Circle 452, page 85

TPR

(*continued from page 78*)

to our future requirements for compact, flexible information storage methods."

Harold A. Strickland, Jr., vice president and general manager of the Industrial Electronics Division, said that TPR should "greatly expand the total market for recording devices of all kinds. We believe that its bandwidth, density, and other capabilities enable us to achieve results not possible with present recording media. To the extent that it might compete with established media such as photographic film and magnetic tape, we would expect both economic and performance considerations to determine its degree of acceptance."

George L. Haller, vice president and general manager of the Defense Electronics Division, pointed out some non-classified military applications being made at the Company's Electronics Laboratory in Syracuse. "Because of its wideband, high-density recording, and direct read-out capabilities," Haller said, "a multitude of military applications exist for such a versatile display device in such areas as radar and infrared detection, electronic countermeasures, missile guidance, and military communications." He said in answer to a question that working models of TPR equipment would be in the hands of the military within a year.—THE END

A COURSE IN FILM MAKING

The NEW SCHOOL at 66 West 12 Street in Manhattan announces a course in Motion Picture Production Techniques, by ARNOLD EAGLE. This course will be given each Thursday from 8:10 P.M. to 11:10 P.M. beginning February 4. There will be 15 class sessions plus three field trips. For those whose profession directly or indirectly calls for a basic knowledge of professional film techniques and production, e.g., advertising and public relations, visual education in schools, film making in industry and science. It is especially oriented for still photographers who are contemplating movie making. Lectures and demonstrations in the theory of film making and practical experience in the use of professional equipment. Outstanding films in various categories are screened and analyzed. Important film makers as guest lecturers show their films and discuss their production problems with the class. The class participates in making a short film to get practical experience.

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AUDIO-VISUAL

PICTUREPHONE 253
McClure Projectors, Inc. Illustrated brochure includes specifications and prices for sound filmstrip projectors.

RECORDED MUSIC 201
Boosey and Hawkes. 24-page catalog of recorded music for motion pictures and audio-visual presentations.

REAR-VIEW FILMSTRIP PROJECTOR 257
C.O.C. Industrial. Specification sheet for C.O.C. Examiner portable rearview projector. Includes price.

VISULITE 244
Teenifax Corp. Illustrated brochure describes the portable illuminated transparency viewer with a 13 3/4 x 18¼-in. screen housed in a luggage case. Includes price.

SLIDEBINDING 259
Emde Products, Inc. 4-page descriptive price folder of slide binding materials for 2 x 2, super slides, 2 3/4 x 2 3/4, 3¼ x 4 and stereo slides.

CAMERA & LENS

SPACE PHOTOGRAPHY 241
General Electric. 12-page booklet gives a descriptive summary of General Electric's space camera systems for securing photographic records. Illustrations include examples of the data recorded from Atlas and Thor missiles.

70MM PHOTOGRAPHIC RECORDER 252
Benson-Lehner Corp. Illustrated specification sheets describe the new Benson-Lehner HS-70A Photographic Recorder capable of frame rates up to 80 fps. The camera is said to be ideally suited for telescope tracking installations due to a "dynamically balanced mechanism."

CALUMET VIEW CAMERAS 202
Calumet Mfg. Co. Two illustrated brochures give specifications and prices of the all-metal Calumet 4 x 5 and 8 x 10 view cameras.

HOLLYCAM CATALOG 204
Hollywood Camera Co. 32-page catalog of cameras, lenses, accessories, processing equipment, film and paper.

HIGH-SPEED CAMERAS 258
D. B. Milliken Co. 4-page illustrated folder gives general specifications of Milliken 16mm high-speed cameras of modular design. Also lists accessories available.

CAMERA-SYNC 506
Chadwick Helmuth Co. Data sheet for Camera-Sync system of taking slow motion films of vibration tests using normal film speeds. Includes prices for Camera-Sync and 16mm pulse camera.

GRAPHIC ARTS

VACUUM PRINTER & DEVELOPER 210
Savin Business Machines Corp. Illustrated price sheet describes the Savin Vacuum Printer and developer for making offset plates with the new Gevaert Contact Process.

CRONAR FILM 211
E. I. Du Pont. Illustrated brochures for Du Pont's Ortho M Litho and Clear Back Ortho Film includes technical data on these polyester-base graphic arts films.

A. B. DICK DUPLICATOR 212
A. B. Dick Co. 6-page brochure describes the Table-Top Offset Duplicator and its method of operation.

MICROFILM PROGRAM 213
Minnesota Mining and Manufacturing Co. 8-page booklet entitled *Let's Take a Positive Look at Microfilm*, is authored by Edward Rosse, head of the Social Security Administration's microfilm program. Basic uses of microfilm are treated.

WASHABLE DRAFTING FILM 214
Keuffel & Esser Co. 4-page folder and sample sheet of K&E's Herculene drafting film made of Du Pont Mylar. Drawings made with Duralar plastic pencils on Herculene can be cleaned with mild soap and water without affecting line density it is said.

REPRODUCTION PHOTOGRAPHY 215
Rik Shaw Assoc. Ltd. 52-page book *Know Your Photography, Reproduction-wise*, discusses methods for preparation and costs involved in visual presentations for TV, slides, displays and filmstrips as well as other communicative methods.

PHOTO-COMPOSITION MACHINE 501
Filmotype. Illustrated brochure describes operation of the Filmotype photo-composition machine.

CONTACT SCREENS 502
Caprock Developments. 4-page price list of grey contact screen for producing halftones from continuous tone copy.

WHITEPRINTING MACHINE 503
C. F. Pease Co. Specification sheet for the Scout semi-automatic whiteprinting machine. Includes prices.

FOR THOSE WHO DEMAND THE FINEST in

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- Complete BLACK & WHITE 16-35 mm film processing.
- Complete EASTMAN COLOR 16 - 35 mm negative — positive processing.
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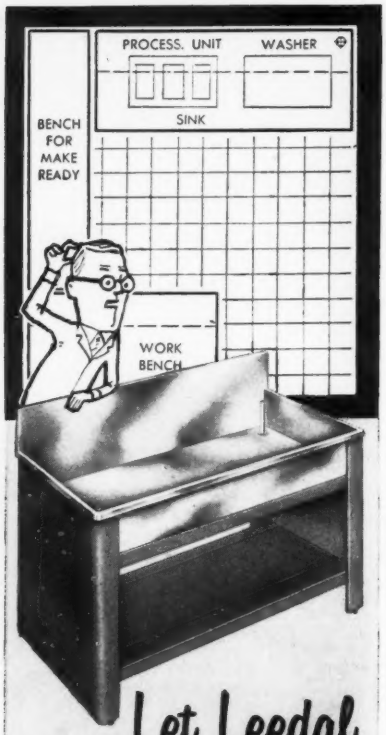
Get more information. Circle 457, page 85



Let Leedal Help You Plan a More Efficient Darkroom!

Efficient darkroom planning will save processing time and speed production. Leedal's catalog (see coupon below) has a complete section devoted to layouts for typical film and print rooms with suggestions for painting, plumbing, ventilating and wiring. If yours is a special problem, we'll help you solve it quickly. After the darkroom is planned, fill it with Leedal Stainless Steel equipment.

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Get more information. Circle 450, page 85

ELECTRIC COLLATORS 242
Collamatic. Illustrated brochure gives specifications of the Colamatic Electric Collators, from desk-top size to automatic units, which collate up to 30 sheets.

DITTO MASTERFAX 245
Ditto, Inc. 8-page brochure describes the applications and operation of the new Ditto Masterfax table-top machine for office copying, laminating, offset masters and direct process (spirit) masters.

POST REPRODUCTION MACHINES 246
Frederick Post Co. 8-page catalog and price list describes the Post line of reproduction machines from economy through automatic models.

ANSCO HANDBOOK 248
Ansco. 60-page Graphic Arts Handbook includes data on Ansco's materials for graphic arts purposes. Has sections on chemicals, films, processing, etc.

ROTOLITE WHITEPRINTER 504
Rotolite Co. 4-page price list includes operating procedure for Rotolite whiteprinters for "on the spot" copying.

EQUIPMENT

TEMPERATURE CONTROL 205
Oscar Fisher Co., Inc. Illustrated specification sheet describes the Oscar Fisher temperature control which is said to maintain constant control to within ¼° F.

CHILL-CHASER 206
Still-Man Equipment Corp. Illustrated brochure gives specifications and prices of the Chill-Chaser electric immersion heaters for developing tank or tray.

FLASH PHOTOGRAPHY 207
Heiland Photo Products. 36-page booklet relates the history of flash photography from *Fambeau to Futuramic.*

HERCULES TRIPODS 209
Quick-Set, Inc. 4-page illustrated price sheet gives specifications of the Hercules industrial tripods and their accessories. Includes a Lo-Hi unit which drops the camera to floor level for low-angle shots.

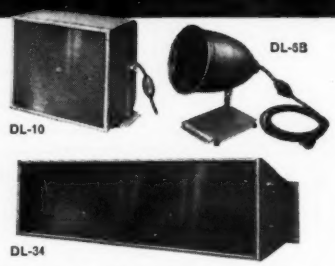
PRINT WASHER 250
A. J. Ganz Co. Illustrated card describes the DeHypo turbulator print washer which is said to convert a sink or tub into an efficient print washer. Includes price.

LAMINATING PRESS 262
Newmark Associates. 4-page folder lists advantages offered by the New-Marko press for laminating photos and cards in thermoplastic. Includes prices.

SIMMON MASKING ATTACHMENT 263
Simmon Brothers, Inc. Illustrated price sheet for the Omega Masking Attachment for use with Simmon Omega enlargers.

HERSHEY SUN LITES 264
Hershey Manufacturing Co. Catalog sheet describes the Hershey Sun Lite electronic flash units including the new Hi-Pro.

DARKROOM SAFELIGHTS



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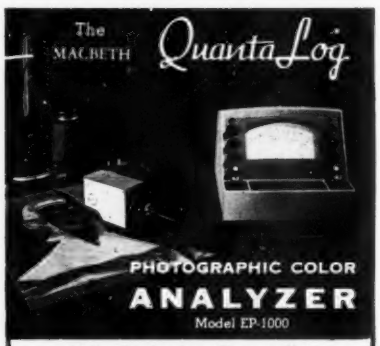
Get more information. Circle 463, page 85



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Since the introduction of the EP-1000 nearly a year ago the response of the first users has been enthusiastic. This enthusiasm has been magnified as more and more of these fine instruments are put into use. We wish to express our gratitude to the many professional photographers and technicians who have made this overwhelming success possible. Here are a few of the comments:

"When I index the EP-1000 to my standard negative and analyze an unknown negative it's like making a first print electronically."

"I received my QuantaLog EP-1000 during the Christmas processing rush. In my first day of use I printed 100 color negatives with only four makeovers."

If you have not seen and tried the EP-1000 here are just a few of its advantages: High sensitivity—Easy to operate—Moderate cost—Designed to work, "on-easel" with any enlarger. Will accurately predict filter pack and exposure time of any printable color negative—Takes the waste (time and Materials) out of color printing because you make your first print electronically.

We invite you to write c/o Dept. B for a 4-page brochure which will describe the features and advantages of the EP-1000. If you wish to see and test the instrument let us know and we will send you the name of your nearest authorized Macbeth dealer.

MACBETH INSTRUMENT CORPORATION
P.O. BOX 950 NEWBURGH, N. Y.

Get more information. Circle 453, page 85

ROTARY SKYDROP 261
Krank-N-Roll Manufacturing Co. Specification sheet for the Rotary Skydrop holds 4 different rolls of seamless paper background material, any width and any length. Includes prices.

FILM PUNCHES 265
Condit Manufacturing Co. Catalog sheet includes three models of film punches used for registration where films must be used for multiple exposures.

MOTION PICTURES

35MM PROJECTOR 255
S.O.S. Cinema Supply Corp. Specification sheet describes the operating procedures and power requirements for the X-Raydiola 35mm projector with variable speed drive, forward and reverse plus single frame projection.

STOP-MOTION PROJECTOR 256
Red Lake Laboratories. Illustrated specification sheet for the Red Lake 35mm Stop-Motion projector.

PROCESSING MACHINES 208
Ana-Tec Inc. 4-page brochure describes the Multi-Matic Filmaster automatic film processing machines for 16, 35 and 70mm black-and-white and color films. Includes the Mobilmaster trailer unit.

COST ESTIMATOR 509
Consolidated Film Industries. Slide-rule-type estimator for 16 and 35mm which automatically estimates running time, footage or cost of film from any one of these factors is offered by this New York and California firm.

MAGNASYNC 510
Magnasync Mfg. Co. Two price sheets include information on how to select a recorder to start a Magnasync-Magnaphonic sound system for motion picture recording applications.

ACCESSORIES FOR KODAK K-100 251
PAR Products Corp. Illustrated price sheet describes electric governor controlled universal motors for Kodak K-100 cameras which operate at 8-64 fps. Reverse side of sheet describes the PAR 400-ft. magazine for the K-100 camera.

SERVICES

DENVER COLOR LAB 511
Roundtree Color Lab. Two brochures offered by the Denver outfit include price schedules for complete color services for the still photographer.

MOTION PICTURE PROCESSING 217
General Film Laboratories. 16-page illustrated booklet describes the complete motion picture color processing services offered by this Kansas City and Hollywood outfit.

MISSOURI CINE LAB 247
Calvin Productions, Inc. 4-page price list for 16mm black-and-white and color processing services offered by this Kansas City, Mo. firm.

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Rigid Tripod with gear-driven Elevator adjusts height quickly and precisely.

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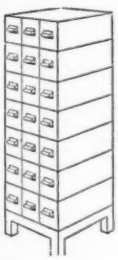
NEGA-FILE
sectional files for 3¼ x 4 slides



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ANGLE GROOVE SLOTS give slide protection & easy insertion or removal.

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NEGA FILE
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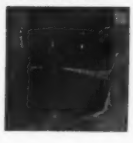

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COMPLETE LABORATORY SERVICE FOR 16 MM • EDITING RECORDING • TITLING • RELEASE PRINTING • FILM STRIPS

Get more information. Circle 419, page 85

HOLLYWOOD VALLEY LAB 222
Hollywood Valley Film Laboratories, Inc. 5 price sheets for complete 8 and 16mm film services offered by this Studio City lab. Includes both black-and-white and color work.

WESTERN CINE SERVICE 203
Western Cine Service. 16-page producer's price list of complete 16mm cine services offered by this Denver lab. A price card of sound recording, editing and duplicating services on discs and ¼-in. tapes is also included.

MOVIE LAB 216
Hollywood Valley Film Laboratories, Inc. 5 price sheets for the 16mm film services offered by this California firm.

SUPPLIES

PROMICROL 218
Malcolm B. Dias. Price sheet for Promicrol film developer and Promicrol replenisher.

LIQUID NEOPRENE 219
Pro-Chem Co. Specification sheets describe the Pro-Chem liquid air-curing neoprene protective coating which may be suitable for the lab or darkroom.

DARKROOM TIPS 220
Peerless Photo Products, Inc. Handy chart suitable for wall hanging lists many causes and preventitive measures for print problems, from Abrasion to White Spots.

SILVERCEL BATTERIES 221
Yardney Electric Corp. 8-page bulletin describes the Silvercel batteries for aircraft installations where miniaturization is an important consideration.

CHEMICAL CATALOG 507
Philip A. Hunt Co. 48-page catalog of Hunt Photographic and Graphic Arts Chemicals. Includes prices. Requests for this publication must be made on company letterhead.

FILM SPEED BOOKLET 508
Carl Zeiss, Inc. 12-page film speed booklet lists exposure indexes of European photographic films as well as the American brands. A conversion table for transposing film speed values from differing systems is included.

PERMAFILM TREATMENT 240
Permafilm Inc. 2-page reprint from the *SMPTE Journal* entitled "Lengthening the Life of Film," deals with cleaning film and impregnating emulsion with Permafilm compounded.

ANTI-STATIC FILM CLEANER 224
Electro-Chemical Products Corp. Illustrated folder describes the Ecco No. 1500 antistatic film cleaner which contains no carbon tetrachloride and also Speedrol applicators for cleaning 16 and 35mm film.

PHOTO BOOK CATALOG 239
Amphoto. 26-page catalog of photographic books includes subject and title cross-index.

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NEW PRODUCTS

For additional information on any new product circle the appropriate number on the readers' service card, page 85.

PROCESSING TANKS 102

Three new Type 316, heliarc welded, hot acid passivated, 24 gauge stainless steel photographic processing tanks have been announced by the Time-O-Lite Professional Products Division of Industrial Timer Corp. The capacity is 3½ gal. and they are offered in two different styles; lip type, and insert type. The tanks have been designed for use in a color process incorporating nitrogen burst agitation. Lip type tanks are available with a built-in gas plenum, or for use with a portable type plenum. The bleach tank is made of heliarc welded red brass.

PHOTOCOPYING MACHINES 103

A new line of office photocopying machines were recently introduced by the Copease Corp. The Copease Crusader is a one-step silver diffusion transfer machine designed to copy all original material up to 8½ in. wide by any length. The machine performs the entire photocopying operation of exposing and printing in a single operation. The positive paper is contained in roll form within the unit, making it necessary to insert only the original copy and negative in actual use.

Other new photocopying machines are the Copease Champion, designed for general office copying work up to 15 in. width; and the Copease Comet, a desk top unit for material up to 9 in. wide.

CAR-TOP CLAMPS 111

A set of three bronze clamps which are said to hold a camera tripod atop a car or station wagon has been announced by The Camera Mart, Inc. A set of three clamps is priced at $28.

INTERCHRON TIMER 112

Control of up to 16 sequential time intervals of up to 30 min. each can be timed in 10-sec. increments and the entire program repeated through the use of a reset control switch on the new Interchron Timer according to the manufacturer, the Bald Eagle Corp.

The timer is driven by a synchronous motor and is said to provide accuracy to within 1 per cent of the 30-min. maximum for each interval. The device is said to provide for adjustment of any one time interval independently without affecting the others even though the timer is in operation. At the end of each interval a chime sounds for timing manual operations and an electrical contact closes momentarily to operate relays, switches, solonoids, etc. on other equipment.

MAGNETIC FILM STRIPING 113

S.O.S. Cinema Supply Corp. recently announced two magnetic film striping machines. One employs a bead type applicator while the other laminates an oxide coated material to the film. Both lay a full soundtrack (100 mil.) or half track (50 mil.) and a balance strip (8 mil.). The SOSOUND Peterson operates at better than 2200 ft. per hour. Two stripes may be applied simultaneously. The oxide mixture wells have interchangeable application discs, with micrometer adjustment of layer thickness. After passing through the enclosed drybox, an adjustable polisher imparts a high gloss to assure good sound reproduction and minimize head wear. Price: under $3,000.

The SOSOUND Cinemaphon has a top speed of 1320 ft. per hour. It laminates the stripe with a special cement which is then bonded to the film as it passes over a heated drying drum. An inspection lamp is provided. Price: under $2,000.

BENSON-LEHNER CAMERA 114

A 70mm camera capable of frame rates up to 80 fps is the new Benson-Lehner HS-70A Photographic Recorder. The unit with its 1000 ft. film capacity and "dynamically

(*continued on page* 88)

Here's the Electronic Flash Every Professional Photographer Needs!

Powerful • Compact • One-Piece Unit • Reasonably Priced • Modeling Light Included

NEW SUN-LITE *Hi-PRO* MODEL M

The new Model M Hi-Pro provides a tremendous amount of light for large areas . . . has other great features. Operates from camera shutter or as a complete slave, as shown in photo at right. Convenient outlet on each unit eliminates extension cords. Ideal for studio or on location. Gray wrinkle finish. **Self-Contained**

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FAST RECYCLE TIME—8 seconds at full power, 5 seconds at half power.
SYNCHRONIZATION—"X" or "O" delay only.
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HIGH POWER RATING—Full power 150 Watt-Seconds, half power 75 Watt-Seconds.
BEAM CANDLE POWER SECOND RATING—4000.
EFFECTIVE CANDLE POWER SECOND RATING—3950.
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Photos by Guy Carrol, Elmhurst, Ill.

MODEL M

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200	210-300	310-450
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CITY & STATE_____ F60

Get more information. Circle 504, page 85

balanced mechanism" is said to be suited for telescope tracking installations. The framing rate is variable and can be as low as 7 fps. Rate change is accomplished by shifting two manual levers located on the camera housing. Power requirements are 208V AC, 60-cycle, three-phase, four-wire, to the control box. A shutter correlation pulse is triggered at the apex of the shutter opening regardless of the size of the shutter opening. The recorder is also equipped with a timing light assembly, footage counter, and take-up motor. Other accessories are available.

ULTRABLITZ MONOJET FLASH 115

A single, self-contained electronic flash unit which features a permanently sealed-in nickel-cadmium battery is the Ultrablitz Monojet electronic flash unit recently announced by Allied Impex Corp. The 40-watt-second unit is said to provide 50 flashes per charge and recycling time of only 9 sec. Flash duration is 1/2000 sec. Price: $69.95.

ROTO-WASH FILM TANK 116

A washing tank which accepts reels from the Nikor processing machines (for 16 to 89mm films) has been announced by Burleigh Brooks Inc. In practice the loaded reel is placed on the spindle and the water turned on. Water pressure is used to rotate the reel during washing. Washing efficiency is said to be very high, eight to ten minutes being sufficient to leave a film hypo-free. The Roto-Wash unit is made of stainless steel and accepts up to 100-ft. reels. Price $68.

CRONAR FILMS 117

The new films on .004-in. dimensionally stable and optically clear polyester film base have been announced by Du Pont Photo Products Department. Cronar Ortho M is said to have an extremely high contrast, wide latitude orthochromatic emulsion. The emulsion and backing surface are said to have a unique surface treatment that minimizes contact printing problems caused by Newton's rings and trapped air bells; reduces vacuum draw-down time by a factor of three; and prevents film from sticking together when tray-processing multiple sheets.

HIGH-SPEED FRAMING CAMERA 101

A portable high-speed electronic framing camera weighing only 40 lbs. has been announced by Abtronics, Inc. The Abtronic Model 1 uses image-type tube shutters and the all electronic shutter has a speed range of 0.1 to 10 microseconds. Other ranges can be provided. A separate shutter tube and objective lens is used for each exposure, providing, in effect, the equivalent of four complete independent cameras. Focus and aperture adjustment are completely independent for each channel. Each channel has an independent time delay adjustable from 1 to 1,000 microseconds. The four photos can be taken in sequence or simultaneously as desired. Objective lenses (4) are f/1.4 Nikkor 50mm; recording lens is a Wollensak 75mm, f/1.9. Price of the Model 1 with lenses, two camera backs (Polaroid and Graphic), four extension tubes, and six rolls of Polaroid type film: $8,000.

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Protect your valuable originals, run duplicates
8mm Enlarged to 16mm. 14¢ per finished foot
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FO-RO TRIPOD HEAD 127

A fluid controlled tripod head with 75-lb. weight capacity has been announced by Forbes-Robinson, Inc. It has full 360° pan and 90° tilt. Nylon bearings are used throughout. Designed for 8mm and 16mm cameras or telescopes it is priced at $125.

BRAUN HOBBY FLASH 128

A fully transistorized miniature unit that features a thin 20-oz. power pack and a tiny rectangular flash-head that might be mistaken for a clip-on exposure meter is the Braun Hobby F60 Pocket-Pak unit. The unit owes its small size to a flat wound high voltage capacitor and a miniature nickel-cadmium rechargeable battery. The battery is said to deliver a minimum of 40 flashes per charge with equal recycle time. The unit delivers 40 watts-seconds and has a Kodachrome guide number of 32. Price: $74.50 complete with battery and charger.

ROBOT RETICLES 129

The Robot Royal and Recorder Automatic 35mm cameras can now be supplied with reticles that reproduce on the photograph according to Karl Heitz, Inc. The reticles are built into the camera at its focal plane and are available with crosshair, crosshair with concentric circles, quadrilled or engraved to order. Priced from $22.50 to $30.

16/35 UNDERWATER HOUSING 130

A new 16/35 blimp for Arriflex cameras is said to operate at 300 ft. depth without pressurization according to the Birns & Sawyer Cine Equipment Co. Made of ½ in. welded aluminum girder plate all fittings are stainless steel. The base of the unit accepts both Arriflex sizes and only the tops need be changed when changing film sizes. Price: $2,495.

BATTERY-POWERED VIEWER

The Kodak Illuminated Pocket Viewer for 2 x 2 slides and super slides is powered by two Penlite batteries and a bulb which can be easily removed for viewing in daylight. Two lenses are said to permit viewing slides with both eyes open. Slides are viewed at four times normal size. Price: $5.95.

MOTOR FOR ARRI 35 131

A flat bed governor controlled motor for the Arriflex 35 has been announced by National Cine Equipment Inc. Motor operates at speeds of 8-48 fps. Power is supplied by house current. The units fits standard tripods without any adaption. Price: $395.

TEMPERATURE CONTROL 132

A new tray temperature control unit said to raise and maintain temperature of a solution to within 1°F has been announced by the Still-Man equipment Co. The unit operates on 115V AC and is provided with a thermostat dial for setting the desired temperatures. A temperature drop of ⅛°F automatically starts the operation of the unit. The Chill-Chaser tank or tray units are said to be "completely safe" and have a safety circuit breaker built-in which prevents operation of the unit when not immersed in a liquid.

(*continued on page* 90)

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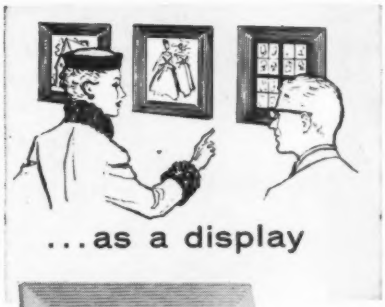

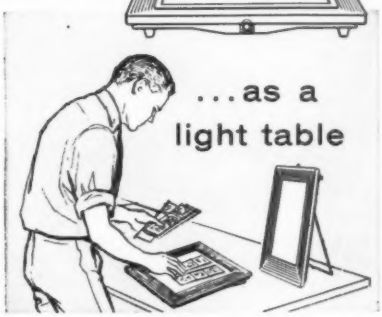

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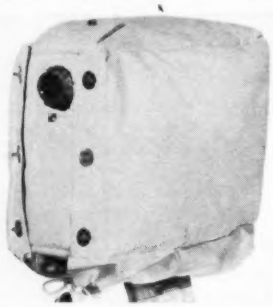
CAMERA PARKAS 122

A line of camera parkas designed to keep the camera warm and dry in any weather and the film pliable in temperatures as low as—60° F., has been introduced by Birns & Sawyer Cine Equipment Co. A three-way control switch can be adjusted for low, medium, or high current draw depending on wind chill and ambient temperatures. Seven layers of sound-absorbing, heat-retaining insulation are said to afford a minimum heat loss and maximum



weather protection. Models are made for Fastax WF4 and WF3; Cine Special with 200-ft. magazine and motor; Bell & Howell 70HR with magazine and motor; Hulcher 70mm; Mitchell 16mm with 1200-ft. magazine; Mitchell 35; Arriflex 16 and 35; Fairchild; Photo-Sonics and Auricon cameras. Prices range from $120 to $256.

PRINCETON COLORTRAN LINELITE 118

A new light developed for use with the Princeton camera has been announced by Burke and James, Inc. The outfit consists of two Linelites with brackets, 8 150-watt normal bulbs and 8 microfloctors and also a ColorTran convertor for increasing voltage and color temperature. A relay is built into the lights, permitting automatic timing with an accessory timer. Price: $299.50.

TRI-PULSE GENERATOR 124

A portable, battery-powered, generator capable of 10, 100 or 1000 pulses per sec. has been announced by the Harwood Co. The unit is said to feed pulses to as many as ten timing lights even under heavy G loads. A miniature 30-volt battery provides the power. Weight is less than 1.5 lbs. The manufacturer states that the unit performs within 1 per cent of selected frequency on sled runs over 40 G's.

DUAL SELECTROSLIDE PROJECTOR 125

A new projector capable of showing up to 96 2 x 2 slides without changing magazines has been added to the line of selectroslide Projectors manufactured by Spindler & Sauppe. Called the Dual Selectroslide model 351, the new unit is actually the standard 300 model as with twins, slide drums on either side of the projection lens.

DIGITAL RECORDING HEAD 119

A 42 bit digital recording head designed to fit on most existing instrumentation cameras has been announced by FMA, Inc. Both the photographic coverage of cameras and instrumentation signals may now be recorded directly on each individual frame of the film, allowing visual and automatic readout of both picture and decoded instrumentation simultaneously.

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PRINTER'S PRINTER
(*continued from page* 49)

all the other enlargers in the print room are Super C Omegas, a pre-war model which features negative stage focusing. This permits various sizes to be used without having to change condensers and makes distortion control easier. Although these enlargers are no longer made, Simmons maintains them, replacing bellows and providing other servicing when needed. These enlargers are hooked up to Time-O-Light timers and rheostats. The rheostats enable the brightness of the enlarging lamp to be increased for dense negatives.

A typical printing sequence starts with the printer taking the negative from its glassine envelope and checking it for contrast and density. Before inserting the negative in the enlarger, it is wiped with an antistatic solution, Ecco No. 1341.

In exceptional cases, ferricyanide local reduction is used after normal development, stop and two-bath fix, but Ralph Baum feels that it can be noticed and therefore tries to keep its use to a minimum. Every print is spotted before it goes out. Print quality is checked by Harry Amdur, manager of the plant and a master printer in his own right. Since the negatives and prints are always kept together during a job, it is a simple matter to send the whole package back to remake substandard prints. Every printer has a stamp which identifies his work.—THE END

PRINTED CIRCUITS
(*continued from page* 55)

finished boards unusable. Unlike ordinary scribers or drawing instruments, these scribing devices 'outline' a circuit line. Thus, two extremely accurate, separate lines are scribed onto the film to outline what will later be a solid line."

Appropriate correction fluids permit changes throughout the operation, but the technique eliminates opaquing. The reproduction of the scribe coat layout to the peel coat takes about 10 min.

GE cited a recent production job involving several complex boards. Thirty hours were needed to prepare each printed circuit layout using the new system as compared with 80 hours using the tape method.

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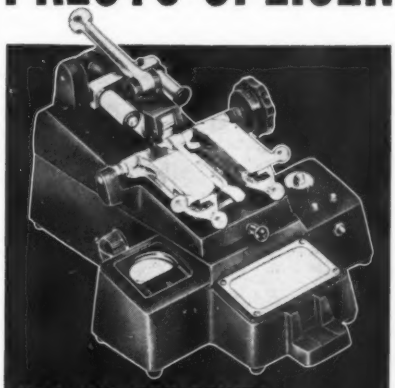

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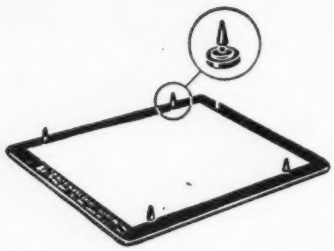

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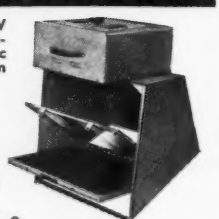

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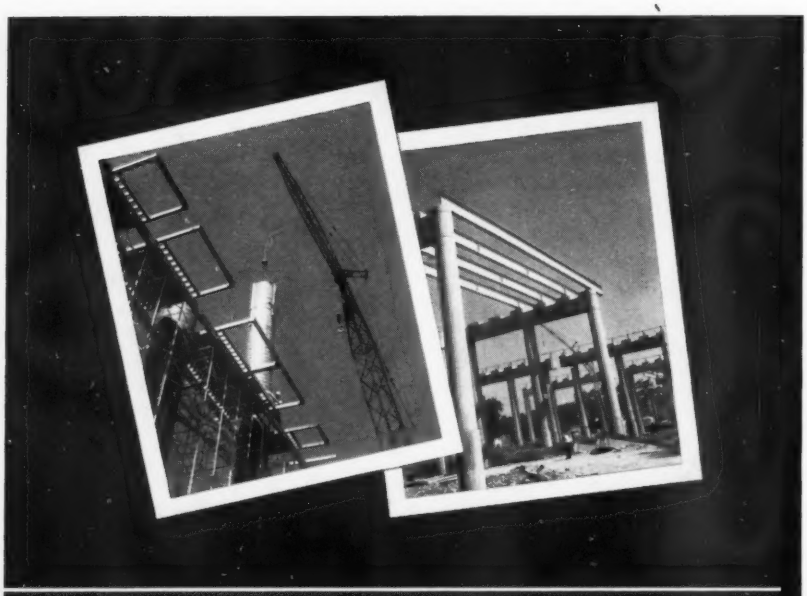

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